



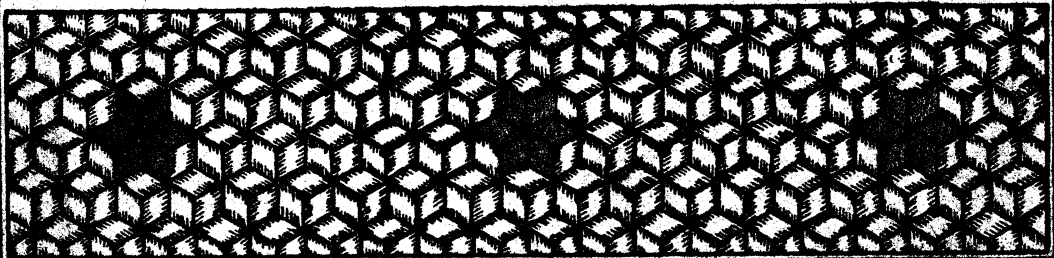
THE PHILIPPINE CRAFTSMAN

OCTOBER, 1912

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INSTRUCTION IN THE PUBLIC
SCHOOLS OF THE PHILIPPINES

VOL. I

NO. 4

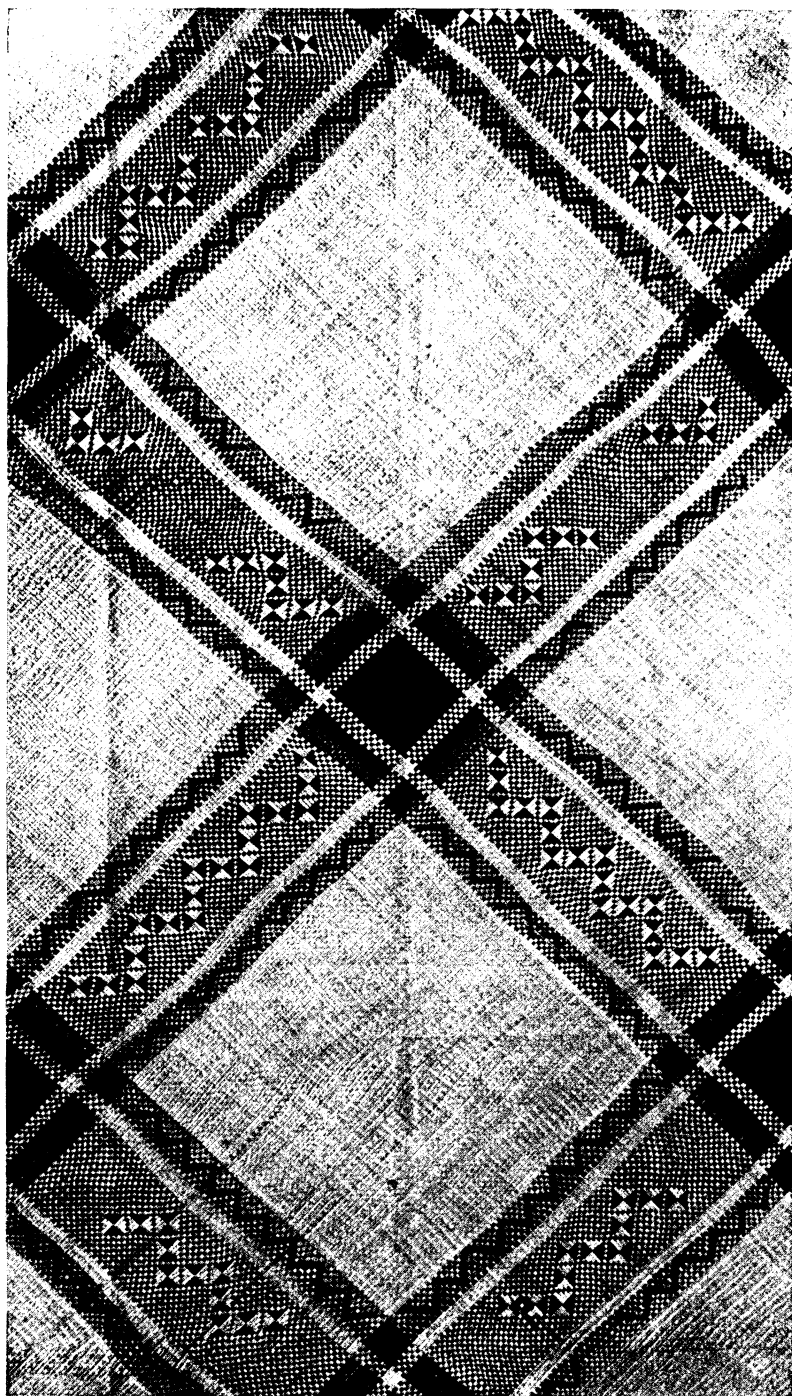


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Good Sabutan Mat.

The Philippine Craftsman

VOL. I

MANILA, OCTOBER, 1912

No. 4

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The business of vocational training
is not only to help the individual
in his struggle for life but also the
world in its effort to rise above the
struggle for life

Arthur D. Dean

The Philippine Craftsman

VOL. 1

OCTOBER, 1912.

No. 4

BAMBOO AND RATTAN FURNITURE.

LEROY R. SAWYER, Industrial Inspector.

ALL through the Orient there is to be seen handiwork in bamboo and rattan, the conspicuous qualities of which are its utility and attractive design. Entire houses are constructed of the former material, and they are often equipped with furniture made from one or both, while many of the ornamental articles of use in the home are fabricated from a combination of the two materials. The Japanese exhibit exceptional skill in applying them to the greatest number of uses, in many of which the work partakes of the finish and excellence characteristic of the best cabinet work of Europe and America. By subjecting the bamboo to different mechanical processes, such as clouding, lacquering and etching, its artistic qualities for the finer kinds of work are greatly enhanced. It also lends itself admirably to the skilled touch of the carver in alto- and bas-relief effects.

In the making of furniture of occidental design from these materials, the Chinese are especially proficient. A very great part of the wicker furniture in use in residences and hotels along the China coast and in the Philippines is made in Hongkong by Chinese workmen. The distinctive value and merit of furniture of this class for this climate will be apparent to any one who reflects on the subject for a moment: (1) It can be inexpensively made; (2) it may be transported at slight expense and trouble and with small chance of breakage; and (3) it is the most appropriate for this country in view of the prevailing climatic conditions and the manner in which houses are here constructed to permit of a semi-outdoor existence.

With respect to the average Filipino home the scarcity of suitable furniture has been commonly noted. A long bench or two, a pillow rack, and a semi-reclining chair generally comprise its furnishings. Convenience and comfort in home life and a proper consideration of health conditions require that these be

more ample and better adapted to the needs of a progressive people. There can be no question that the Filipino home would become much more attractive and livable were it better supplied with suitable furniture; similarly, there can be little doubt that the health and happiness of its occupants would be greatly increased were this improvement effected.

Our present plan of industrial work in the public schools at least suggests that the time is ripe for a serious effort in directing the interest of teachers and pupils into this field of work, in which to date only partial and transitory results have been obtained. In the schools of a number of provinces some very good pieces of bamboo and wicker furniture have been made and various of these have been shown at recent expositions of the Bureau of Education. Conditions now appear to favor emphasizing this line of school industrial work after some systematic, orderly plan, in order that two ends at least may be secured: (1) Equipping the Filipino home with more and better furniture; and (2) developing a line of school industrial work, the profit and utility of which to the student will be inestimable, both as a possible source of income and in its influence on his home life. As a preliminary step in spreading information on the construction of bamboo and rattan furniture and in encouraging its wider use and manufacture, the following brief course is offered. It is not so complete as it should be, but if teachers and others interested in this line of work will supplement it with new and additional pieces, it will be a matter of only a few years until a comprehensive text on the subject may be issued in place of this elementary one. It is hoped that this may be done, and that drawings, photographs and descriptive matter relating to furniture of this class made in school shops will be submitted to the Bureau as the work develops during the next few years.

In a recent circular of the General Office (No. 97, s. 1912) particular emphasis is placed upon this line of work, and it is expected that many primary shops will do a considerable amount of construction work with these materials, in duplicating the pieces there outlined as well as in working out new designs and additional pieces.

BAMBOO AND RATTAN.

KINDS; WHEN GATHERED; HOW TREATED AND PREPARED FOR USE.

The two ordinary kinds of bamboo found in the Philippines may be distinguished from one another by the lengths of their joints. Either may be used in the construction of the furniture

here described, though the long-jointed will be found preferable where sawali matting is to be made, as for screen paneling, in view of the tendency of the fiber at the nodes to fray when split into thin strips. The success in the use of either will depend largely on securing pieces of even diameter and on the careful matching of those to be used in the construction of a given piece of furniture.

Giant and ordinary rattan are the two kinds used in furniture work—the first for framing and the second for wrapping and covering. The diameter of the former is usually about 3 cm., while that of the latter is from 0.5 to 1 cm. Both of these are climbing vines and are to be found in nearly all mountainous districts of the Philippines.

Bamboo can be worked at any time of the year, though native users of this material consider it more satisfactory if the supply is cut and gathered after the close of the rainy season, in November and December.¹ It is then less liable to attack and injury from the small beetles ("shot hole borer") which are likely to honeycomb it both when standing and cut. Bamboo that is at least two or three years old should be selected where possible since younger shoots have a greater tendency to split and crack when being worked.

The sooner bamboo is used after cutting, the better it can be manipulated. If allowed to become dry, it can be bent only with difficulty, if at all, and it will also be more apt to split and chip when tools are applied to it.

Similarly, rattan should be used when fresh to get the best results. If it has become dry, its flexibility may be restored by soaking it in fresh water, though the rattan so treated tends to assume a darker color in consequence.

Joints of bamboo furniture are usually made in any of the following ways: By gluing; mortise and tenon joint, plain or pegged; dowel joint; miter joint; T-joint, plain or wrapped; and angle joint. For the first mentioned, white glue will be found the most satisfactory and care must be taken to properly rasp and scrape all joint surfaces if good joints are to be secured. Wherever possible glue should be used in connection with the

¹ In one province, Pangasinan, it is not only the practice to cut the bamboo during the dry season but "in the morning and before the north wind blows." The reason for this, particularly the two "requisites" included within quotation marks, is not altogether clear; but where scientific or other equally reliable information is lacking, it will generally be found practicable to follow local usage with respect to cutting and handling this material.

other joints as well, as a firmer and stronger connection is thus obtained. Wrapped T-joints are those usually found in Chinese-made wicker furniture. Briefly explained, this is but a T-joint held in position by a wrapping of split rattan passed through a hole bored about two or three centimeters below the joint, on the leg, and drawn over the cross piece and back through the hole, the operation being repeated three or four times, as here shown.

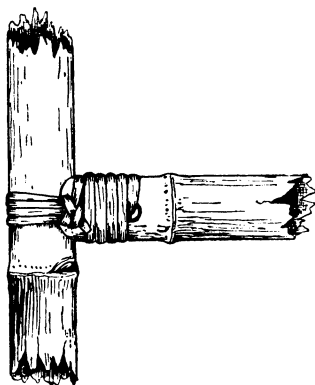


Fig. 1. A wrapped T-joint.

The other regular wood joints mentioned above, used in bamboo work, can be considerably strengthened by utilizing this method of wrapping whenever possible.

Bamboo and giant rattan may be bent in various ways. This fact should be specially noted, as curved parts are essential in the making of the more advanced types of bamboo and rattan furniture. Among the most usual modes are the following: By the blow or spirit lamp; by hot water; and by steaming. The simplest and quickest method will be found in the benzoline

or kerosine blow-lamps, such as are now in use in nearly all trade schools and many school shops of the Philippines. They can be obtained at a cost of approximately ₱6 in any of the principal hardware stores of Manila, or through the Bureau of Supply. The manner of using them is described later in the text. If hot water is used, some long receptacle of bamboo, wood or metal, must be provided, to contain the boiling water into which the piece to be bent must be immersed. Giant rattan can be bent very satisfactorily by this means, and a large shoot of bamboo from which the inner node sections have been removed makes a very suitable container for the hot water. It is generally necessary to leave the piece in hot water for at least half an hour, and in case the boiling water cools down appreciably before the expiration of this time the supply should be renewed. As it is deemed improbable that steam will be used to any extent for the present in connection with this work, in view of the difficulty of installing proper facilities for it, this method will be but summarily described. A chest or long box with air-tight joints is first prepared; into this the piece to be bent is placed. To this box or chest there is an intake pipe by which is admitted the steam which acts on the piece until it is sufficiently pliable for the purpose for which it is to be used. This method is one of the

best known and will be found very effective when the means for installing it can be secured.

In case the blow-lamp is used for bending the bamboo or rattan, either one of the two simple devices which appear in the accompanying sketch will be found helpful for holding the pieces to which heat is to be applied.

The piece of bamboo is slipped through the iron ring, with an end extending under the edge of the table, so that it may be held in place; or if preferred, the hole bored slantingwise through the thick table top may be used instead. With the piece so placed the flame of the blow-lamp is made to move along its under surface, back and forth, care being taken to keep the flame in steady and even movement, otherwise the surface may be badly charred if the flame is held too long at one point. During the application of heat which the piece is undergoing, tension is applied at the free end by drawing steadily and slowly downward all the while until the desired curve is obtained. The operation may take half an hour or more, depending on the diameter of the piece being bent, the curvature wanted, and the power of the blow-lamp. As an aid in bringing the piece so treated to a state of rigidity, cold water may be applied to the surface previously subjected to the flame. In place of the blow-lamp, the spirit lamp of alcohol may be used in the same way, but this will be found much slower.

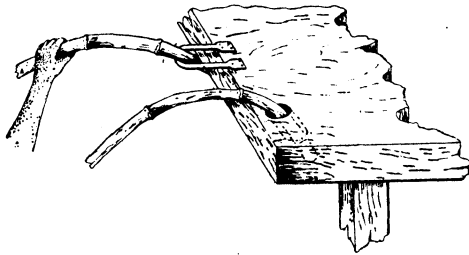


Fig. 2. Device for bending bamboo and rattan.

As a protection to the piece to be bent, in case it is very thick and the operation consumes much time, it may be covered with a thin wrapping of banana leaves. This will prevent it from being charred or burnt by the flame.

The appearance of bamboo furniture will be decidedly improved by a coating of shellac after the piece is completed. This may be prepared and applied in the following manner:

To 450 grams of shellac flakes, orange color, add 50 grams of denatured alcohol. Stir well and see that the shellac is thoroughly dissolved. Before applying, all parts to be shellacked should be well sandpapered, first with No. I and then No. O sandpaper. The shellac may be put on with cotton waste or a clean piece of flannel, or a woollen cloth free from starch; it should be rubbed in well. After the shellac has set on the bamboo and becomes

dry, the surface should be treated again with cotton waste slightly saturated in alcohol, so that the shellac will lie even over all the surface which has been previously treated.

BAMBOO CLOTHES HANGER.

(Plate No. 1.)

This is a piece of simple construction and can be made by any 3rd or 4th grade boy in the school shop. The cross pieces should be of material from 2 to 2.5 cm. in diameter and the pegs of slightly smaller stuff. The outer end of the peg may be a node of the bamboo, so as to form a sort of knob at the extremity. The distance at which the pegs are set into the framework of the hanger may be seen by reference to the drawing. If care is

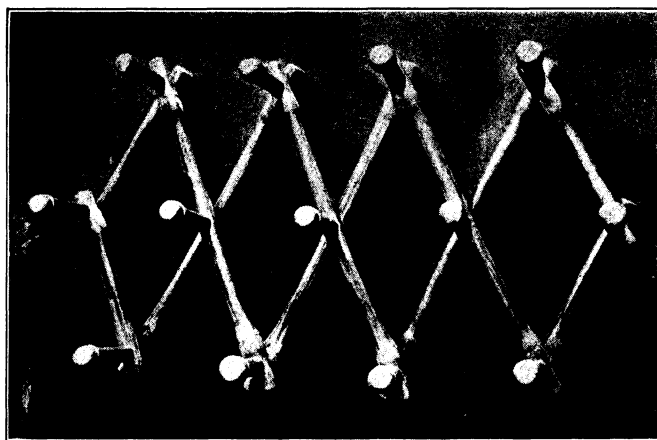


Plate No. 1-A. Bamboo clothes hanger.

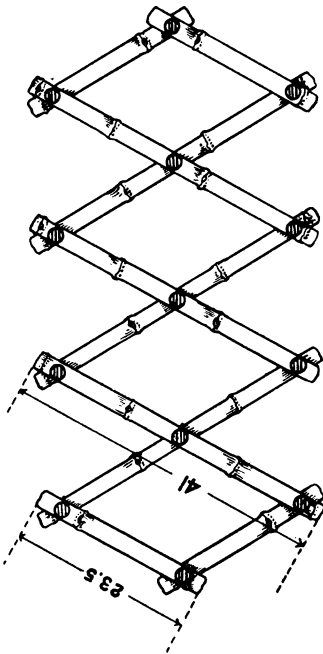
taken in selecting pieces of even diameter for the frame, the pegs will fit into the frame evenly and it can be made to open and close easily and smoothly.

SPLIT BAMBOO STOOL.

(Plate No. 2.)

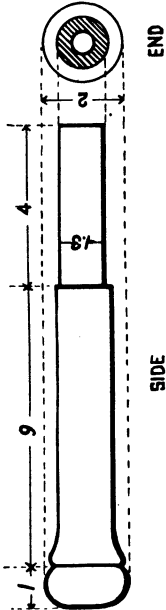
This is a very practical and useful piece of furniture for any home. It is very substantial in make and will bear a great deal of hard usage. The material used is split bamboo, cut from "stock" of 8 to 10 cm. in diameter. As shown in the drawing, the braces are nailed into the legs after these have been notched to receive the ends. The cross brace joining the legs at the point of union is mortised into the legs and nailed. The mat

BAMBOO CLOTHES HANGER
DIMENSIONS IN CENTIMETERS
SCALE 1:5



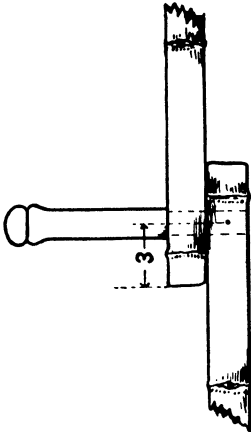
FACE VIEW

HOOK



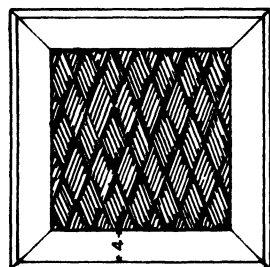
SIDE

END

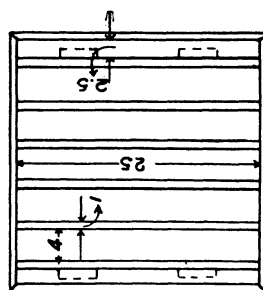


DETAIL OF JOINT

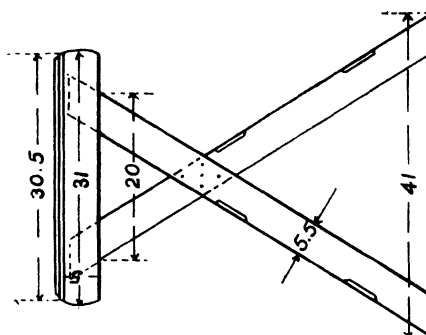
SPLIT BAMBOO STOOL
 DIMENSIONS IN CENTIMETERS
 SCALE 1:5



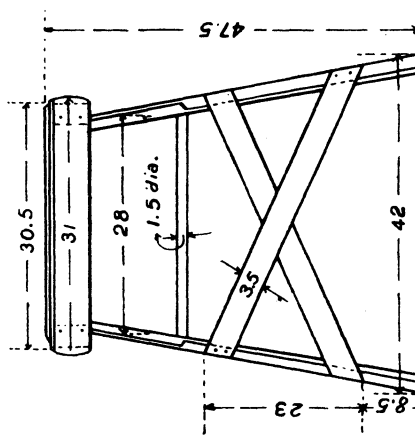
FINISHED SEAT



FRAME OF THE SEAT



SIDE



FRONT

for the seat top should be made of heavy sawali, in the diagonal weave, in order that the under ribs of the seat may not be felt when the stool is in use.

BAMBOO FOOTSTOOL.

(Plate No. 3.)

A low footstool is a very serviceable article for the home and can be put to a variety of uses. The model here shown is made of bamboo of 2.5 cm. in diameter, with wrapped T-joints. For the triangular bracing and rings inserted in the sides of the frame, between rails and legs, small rattan or bamboo of about 1.5 cm. can

be used. If wound with split rattan, as here shown, the appearance of the stool will be improved. The pieces are fastened to the frame with finishing nails, though this can be done by

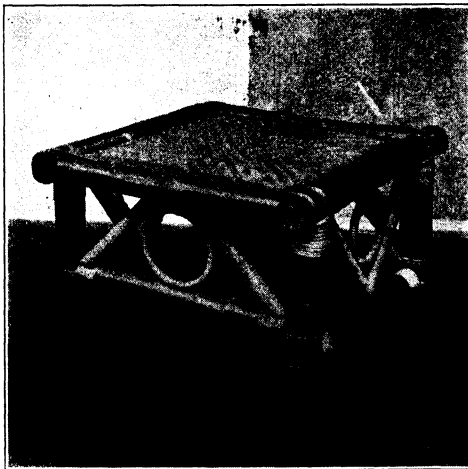


Plate No. 3-A. Bamboo footstool.

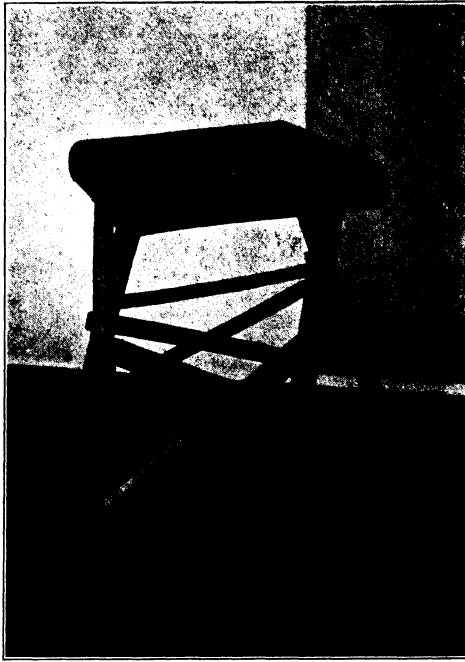
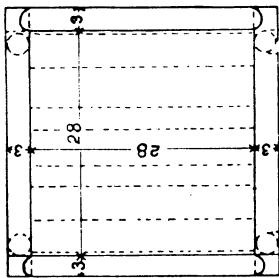


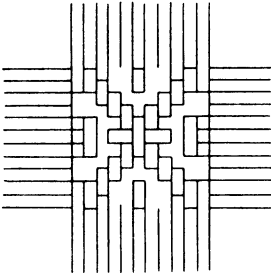
Plate No. 2-A. Split bamboo stool.

wrapping if desired. An ornamental weave to the sawali top will also add much to the attractiveness of the piece. Designs in color may be used in this connection. After the sawali top has been adjusted to the seat frame and made to fit firmly on the seat strips, it may be attached by a thin bamboo or rattan molding placed about the inner side of the seat frame and fastened with brass brads.

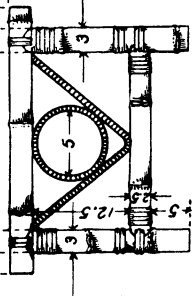
BAMBOO FOOT STOOL
DIMENSIONS IN CENTIMETERS
SCALE 2:10



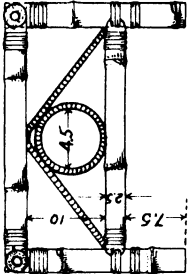
FRAME OF THE TOP



WEAVING OF THE TOP



FRONT



SIDE

BAMBOO STOOL.

(Plate No. 4.)

This is a piece similar in design and construction to that preceding. Legs and seat frame are of stock about 3.5 cm. in diameter. The right angle cross braces joining the legs are attached thereto by wrapped T-joints; at their intersection a wrapped cross lap joint is used. The circular braces are attached to the legs by round headed brass screws. The rest of the construction is much the same as that explained for the bamboo foot-stool.



Plate No. 4-A. Bamboo stool.

BAMBOO CHAIR.

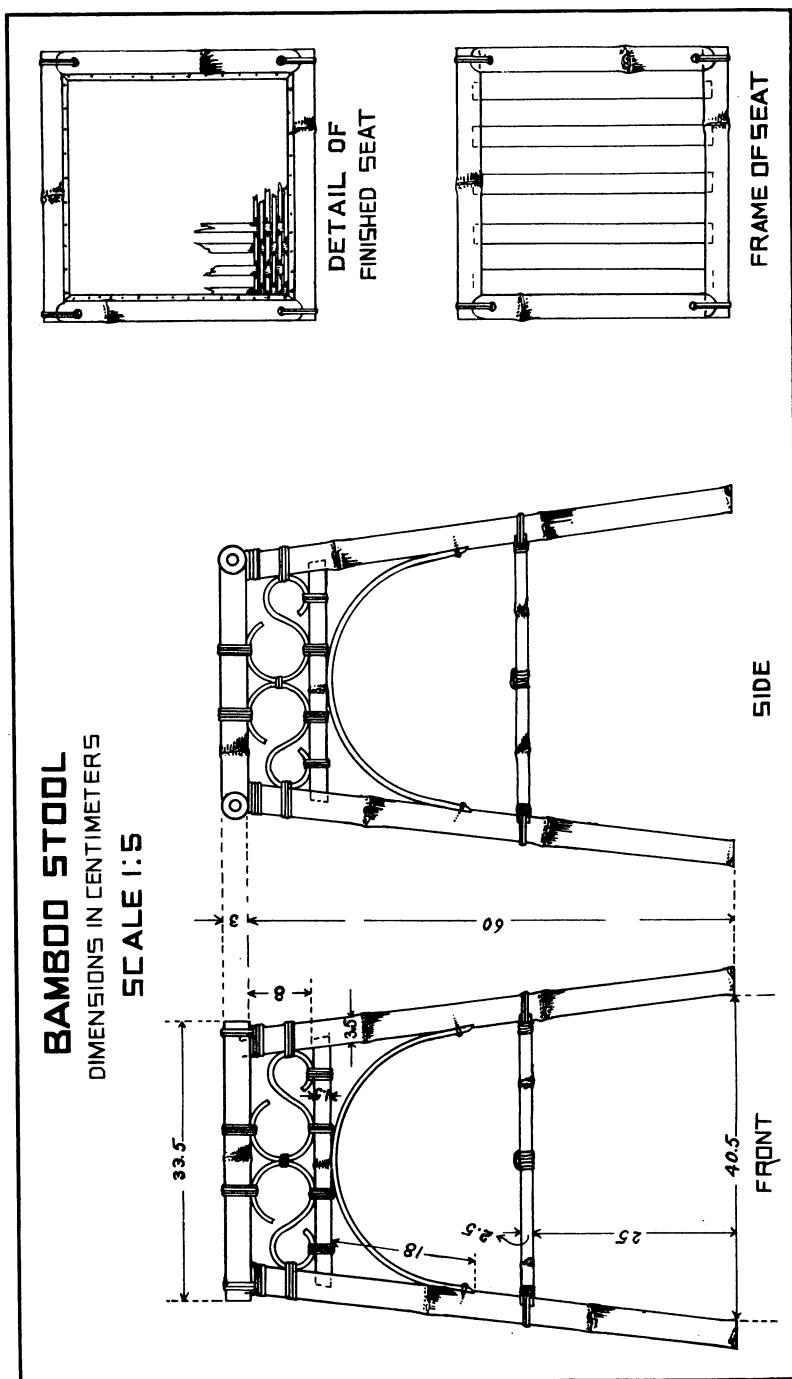
(Plate No. 5.)

This companion piece to the split bamboo stool is made upon much the same lines. It is begun by laying out the legs of split bamboo cut to dimensions; then the front is placed in position, with the rear and middle cross braces, and they are attached with nails after the legs are notched to receive the ends of the braces. Next the materials for the back including the uprights are laid out and the cross-strips are fastened to them; then they are attached slightly to the lower part of the rear legs with the required slope as shown in the drawing. Before the seat frame is definitely attached to the legs, it should be tested with respect to the uprights to see that these come in the correct position as shown in the details of the seat. The back and side pieces of the seat molding will have to be fastened in place last of all. This chair is not the most ornamental that can be constructed of bamboo, but it is one of the best by reason of its strength and the comfort which it provides.

SPLIT BAMBOO TABLE.

(Plate No. 6.)

This piece is very similar in design and construction to those shown in Plates 2 and 5. To obtain strips that are fairly flat



BAMBOO CHAIR
DIMENSIONS IN CENTIMETERS
SCALE 1:5

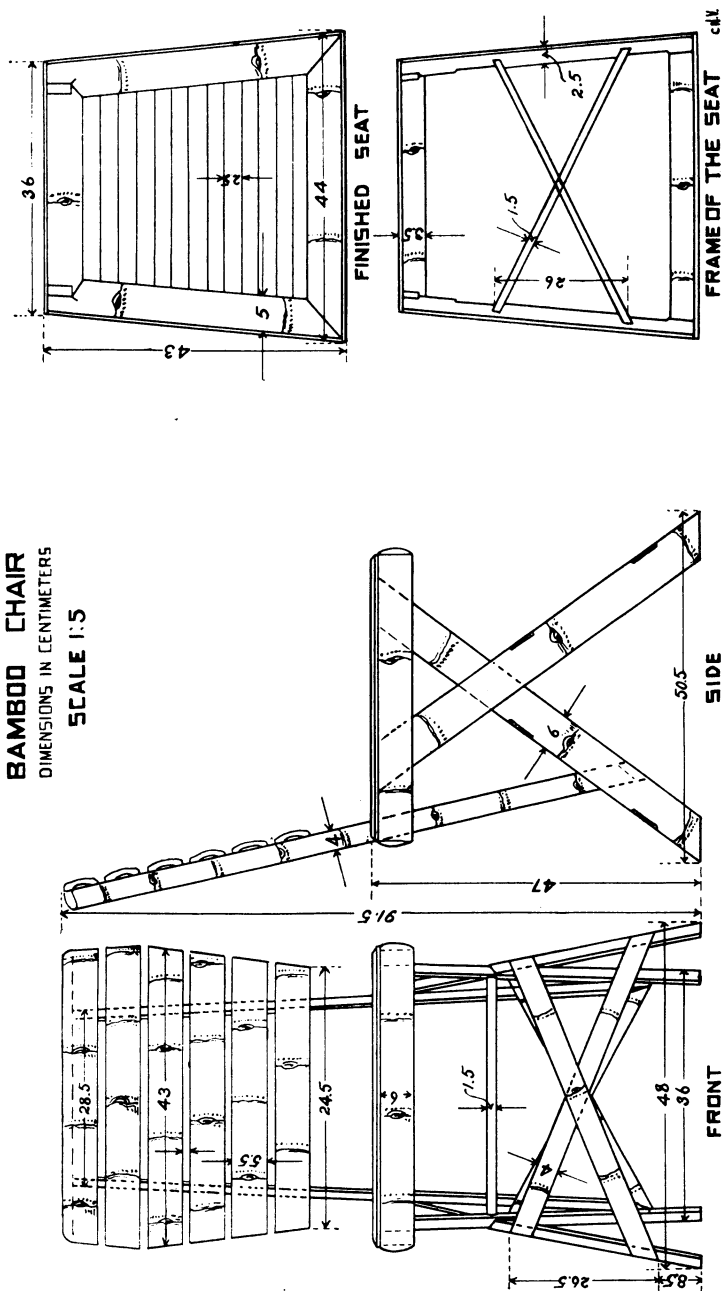
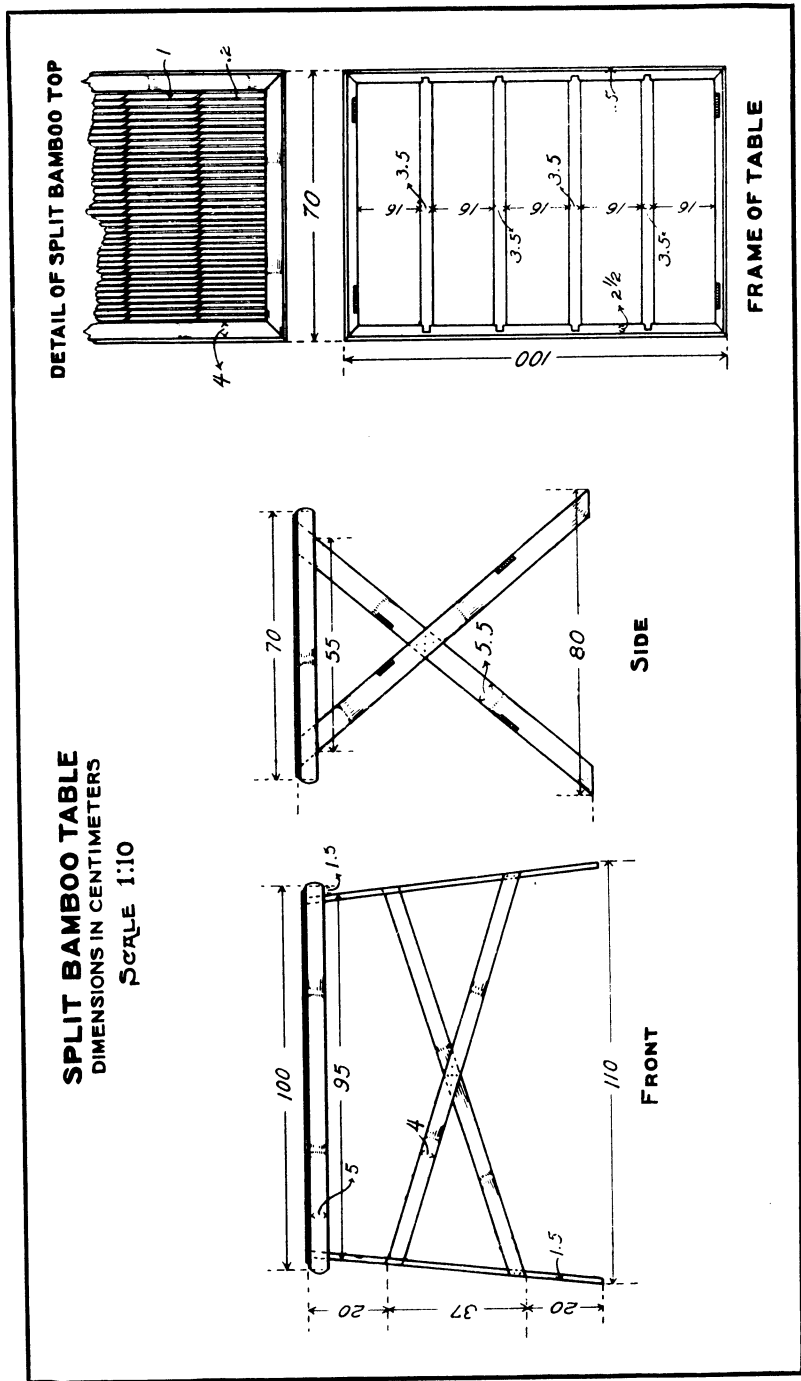


Plate No. 5.



for the legs, braces and molding for the table top, they should be taken from bamboo 8 cm. to 10 cm. in diameter. Cross braces are fastened to the legs as in the two pieces previously mentioned. The tops of the legs are notched into the inner frame of the table top and then nailed. This frame should be of stock 5 cm. by 2.5 cm. The cross braces in the top are mortised into the frame and also nailed. After the split bamboo top has been laid on and fastened to the cross braces by rattan binding similar to that used in native bamboo flooring, the side and top moldings are fastened in place with brads. A substitute method of fastening the split bamboo top to the frame is that of nailing to cross braces of frame. If this method is followed, it may be desirable to close up the spaces between the slats by laying adjoining strips in immediate contact.



Plate No. 5-A. Bamboo chair.

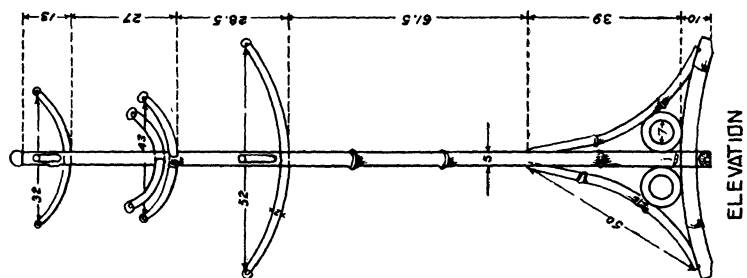
BAMBOO COAT AND HAT TREE.

(Plate No. 7.)

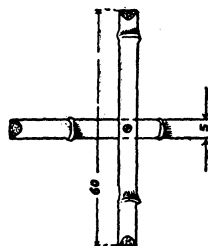
Every home should be provided with a piece of furniture on which garments, particularly coats and hats, may be hung when not in use.

Stock of from 4 to 5 cm. should be employed for the pedestal. Straight pieces should be bent at about the curvature shown in the drawing and fastened by a cross-lap joint and a lag screw running up into the upright previously plugged at the lower extremity. The cross-arms are to be similarly bent and holes of the proper diameter bored in the upright to receive them. To heighten the artistic finish of the piece, the hard shells of the mabolo fruit may be attached to the ends of the

BAMBOO COAT AND HAT TREE
 DIMENSIONS IN CENTIMETERS
 SCALE 1:10



ELEVATION



DETAIL OF THE BASE

cross arms. Similarly, to the top of the upright a sectional knob made of bamboo may be added; it should be glued in position.

BAMBOO WASHSTAND.

(Plate No. 8.)

Considerable care will have to be taken in bending the legs of this piece, in order that the same general curvature may be obtained in all three. This is necessary if a piece of harmonious, pleasing lines is to be secured. Some testing will have to be done before this can be satisfactorily accomplished. By setting up the framework and provisionally tying the under ring in position and the legs together, the general effect can be observed and any under- or over-curving corrected before parts are joined together.

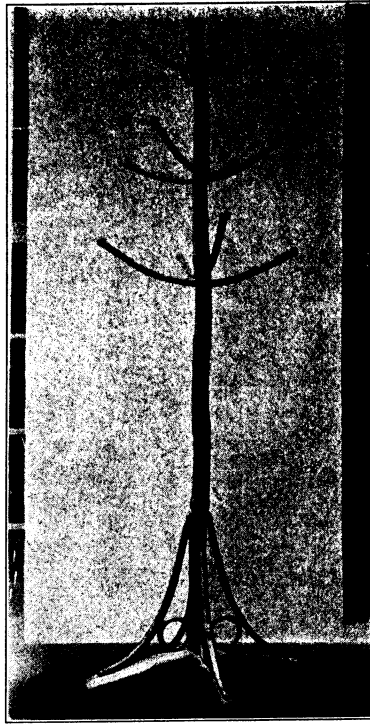


Plate No. 7-A. Bamboo coat and hat tree.

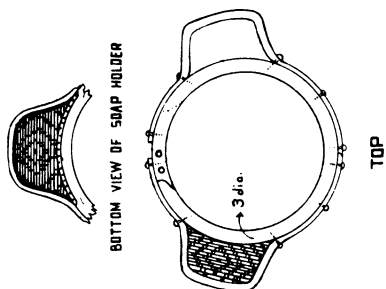
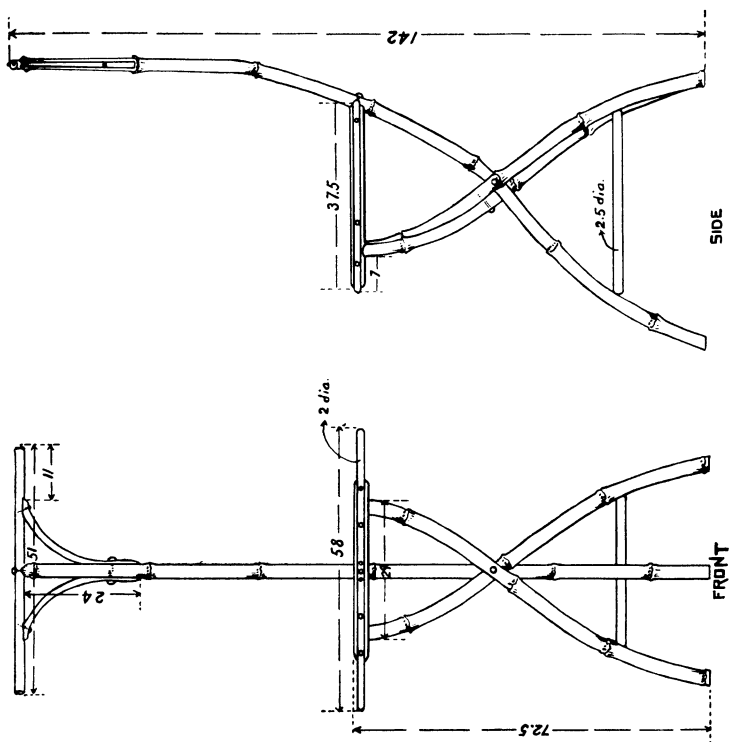
The ring for the basin and the molding running around it to hold the soap dishes are of thick rattan, the latter a half section split lengthwise at points of contact with the basin ring and fastened to it by round headed brass screws. The legs and upright are of bamboo, as well as the cross piece forming the towel rack at the top of the upright. In the illustration and drawing a piece of sawali matting has been used for the soap receptacle, but a desirable improvement can be obtained by making an open-work netting of woven rattan that should hang down some four or five centimeters below the edge of the soap dish frame. It is suggested that this rather than the form here shown be used.

BAMBOO ARMCHAIR.

(Plate No. 9.)

Stock from 4 to 5 cm. is the most suitable for this chair. The pieces for the arms, and the rails for the back and the rear legs will have to be bent to obtain the required curves. Nearly all joints are doweled and pegged and those of the seat frame and lower rails are also wrapped. The seat may be of split bamboo

BAMBOO WASH STAND
 DIMENSIONS IN CENTIMETERS
 SCALE 3:20



or sawali matting, according to the taste of the maker, the degree of perfection desired and amount of time he wishes to spend upon his work. Bamboo of even, regular dimensions should be chosen to obtain a satisfactory chair of pleasing appearance.

BAMBOO BED.

(Plate No. 10.)

Reasons of health and personal comfort render it desirable that the body when at rest recline on a springy, yielding substance. The custom so frequent in this country of sleeping on the floor should be abandoned, as many classes of illness, particularly colds, catarrhs, and pulmonary troubles, may be contracted in this way. If a corn-husk mattress, similar to those

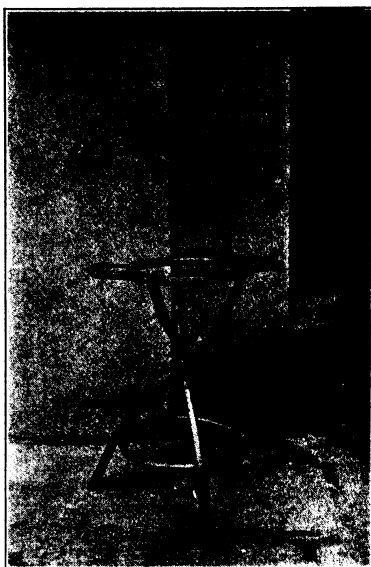


Plate No. 8-A. Bamboo washstand.

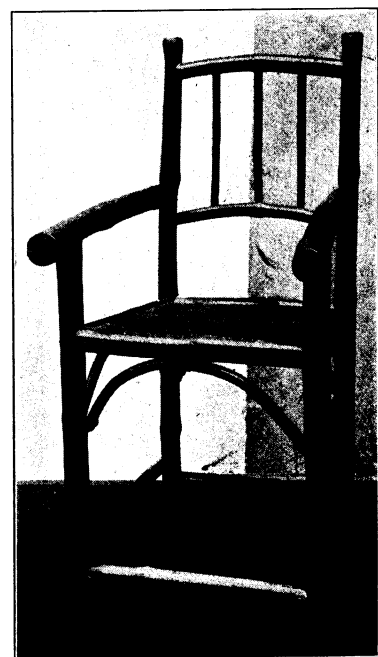
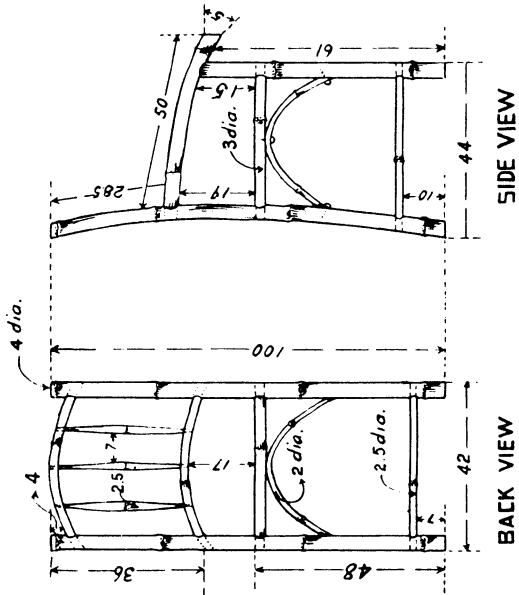


Plate No. 9-A. Bamboo armchair.

which have been made by the municipal schools of Nueva Ecija Province, be fitted to the bottom of this bamboo and rattan bed, a sleeping place that is nearly equal to the ordinary iron bed may be had.

Considerable care will have to be taken in selecting stock for the bed frame and rails, because of their length. They should be straight and of even diameter, in order that the appearance and finish of the bed may be the best. The joints of the bed frame and rails may be doweled, or a double mortise and tenon joint may be used, as shown in the detail of the joint in this plate. In case the latter is used, it should also be pegged or nailed from the side, in order that the joint may be firmly held together. Or, if preferred, the joint may be wrapped as

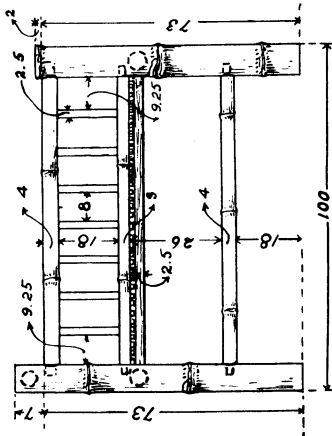
BAMBOO ARM CHAIR
DIMENSIONS IN CENTIMETERS
SCALE 1:10



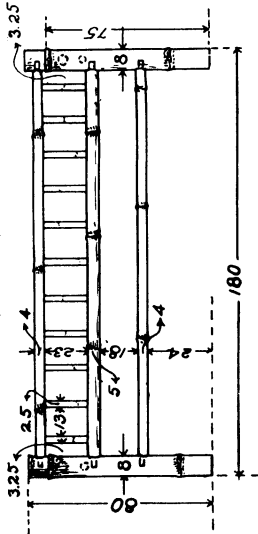
BAMBOO BED

DIMENSIONS IN CENTIMETERS

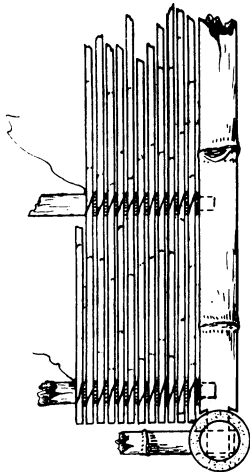
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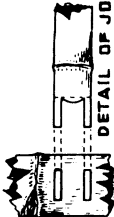
SIDE (SCALE 1:10)



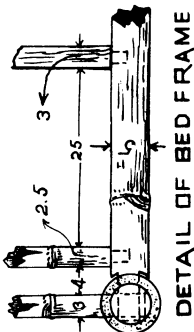
FRONT



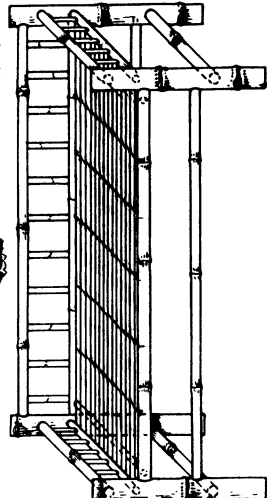
DETAIL OF BOTTOMING



DETAIL OF JOINT



DETAIL OF BED FRAME



CABINET PROJECTION

shown in Plate 4. The stiles should be set into the rails and frame by a mortise and tenon joint; the cross braces of the bed frame are similarly joined to the sides of the frame. These braces are 3 cm. wide and 1 cm. thick. The strips for the bottom of the bed are 1 cm. wide by 0.3 cm. thick and are fastened to the cross braces in the same manner as indicated in the split bamboo table.

BAMBOO CHAIR, ORNAMENTAL.

(Plate No. 11.)

Stock of 4 to 5 cm. in diameter should be selected for the legs and seat frame of this piece and from 2 to 3 cm. for the rails and braces. Both front and back legs should be bent according to details shown in the illustration and drawing; the back legs may be made to flare somewhat more at the top if desired. All the joints are doweled, glued and pegged. The sawali matting for the seat is attached in position by a molding of thin bamboo strips fastened to the side of the seat frame by brass brads. Before the sawali paneling is placed in the back, the pieces to hold it should be channeled about 1 cm. deep. The paneling may be of double thickness supported by thin cross pieces between the two layers.

BAMBOO SCREEN.

(Plate No. 12.)

This screen consists of four leaves, though the number may vary. The circular piece at the bottom and the pieces at the top are of heavy rattan; uprights, rails and stiles are of bamboo. Stock of from 3 to 3.5 cm. will be found most satisfactory for the framework. All joints are doweled, glued and wrapped. The paneling is of bamboo sawali of under and over weave, set into channels made in the inner side of the frame and held in position by a bamboo molding extending completely around it both at the front and back. Round-headed brass brads (escutcheon pins) clinched, or rattan binding may be used to hold

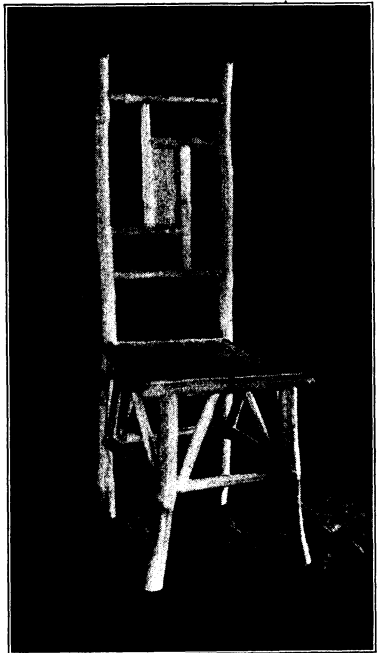


Plate No. 11-A. Bamboo chair, ornamental.

BAMBOO CHAIR, ORNAMENTAL
DIMENSIONS IN CENTIMETERS
SCALE 1:10

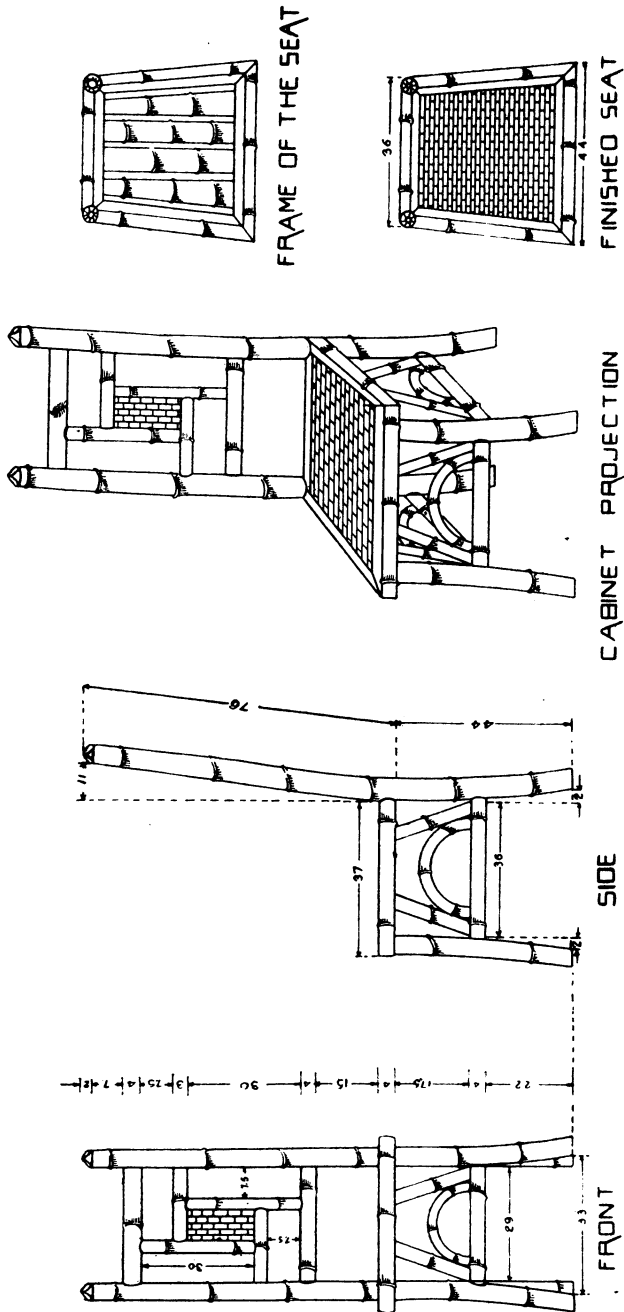


Plate No. 11.

the molding in place. An attractive and ornamental weave for the panels will add greatly to the beauty of this piece. This should be done preferably in one of the different geometrical designs common in sawali weaves, and in harmonious colors. Suggestions and helps along this line will be found in the *Industrial Studies and Exercises, Teachers' Edition*, page 112.

The leaves may be joined together in one of two manners: by thin metal plates of iron or brass in shape of a figure 8 to fit the outline of adjoining uprights, both at top and bottom, as shown in detailed drawing, Plate 10; or by rattan rings encircling adjoining uprights at points just below and above where top and

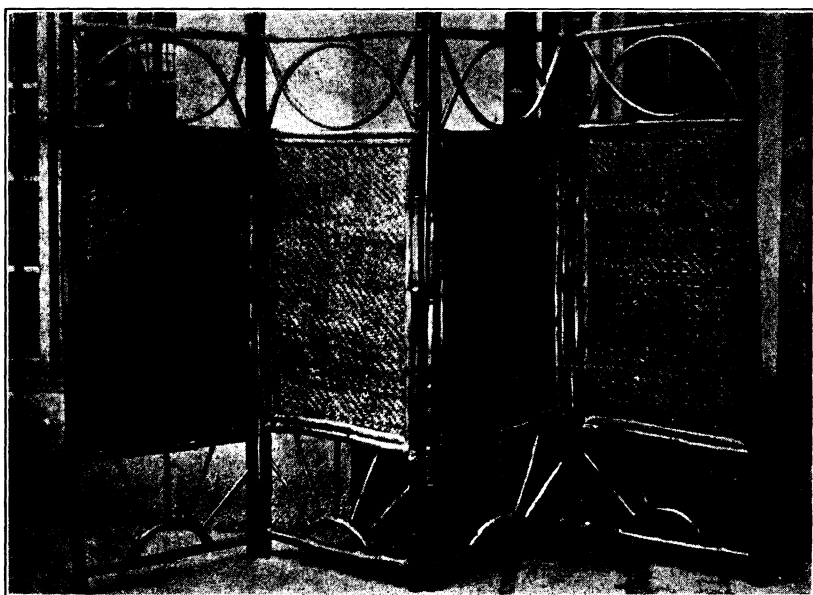


Plate No. 12-A. Bamboo screen.

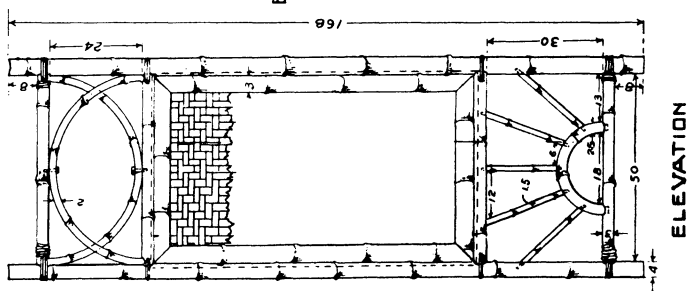
lower rails meet the uprights. (See p. 109, *Ind. Stud. & Ex., Teachers' Ed.*, for illustration of this method.) In case the first method is used the ends of the uprights should be plugged, so that the screws countersunk into the metal may secure a firm hold.

WARDROBE.

(Plate No. 13.)

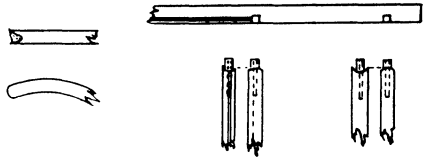
This piece is made of bamboo with the exception of the rattan bracing between the lower rails and legs, and the elbows, rings and circular braces at the top of the back and sides. All joints are doweled and pegged. Sides, front, back and shelving are

BAMBOO SCREEN
DIMENSIONS IN CENTIMETERS
SCALE 1:10



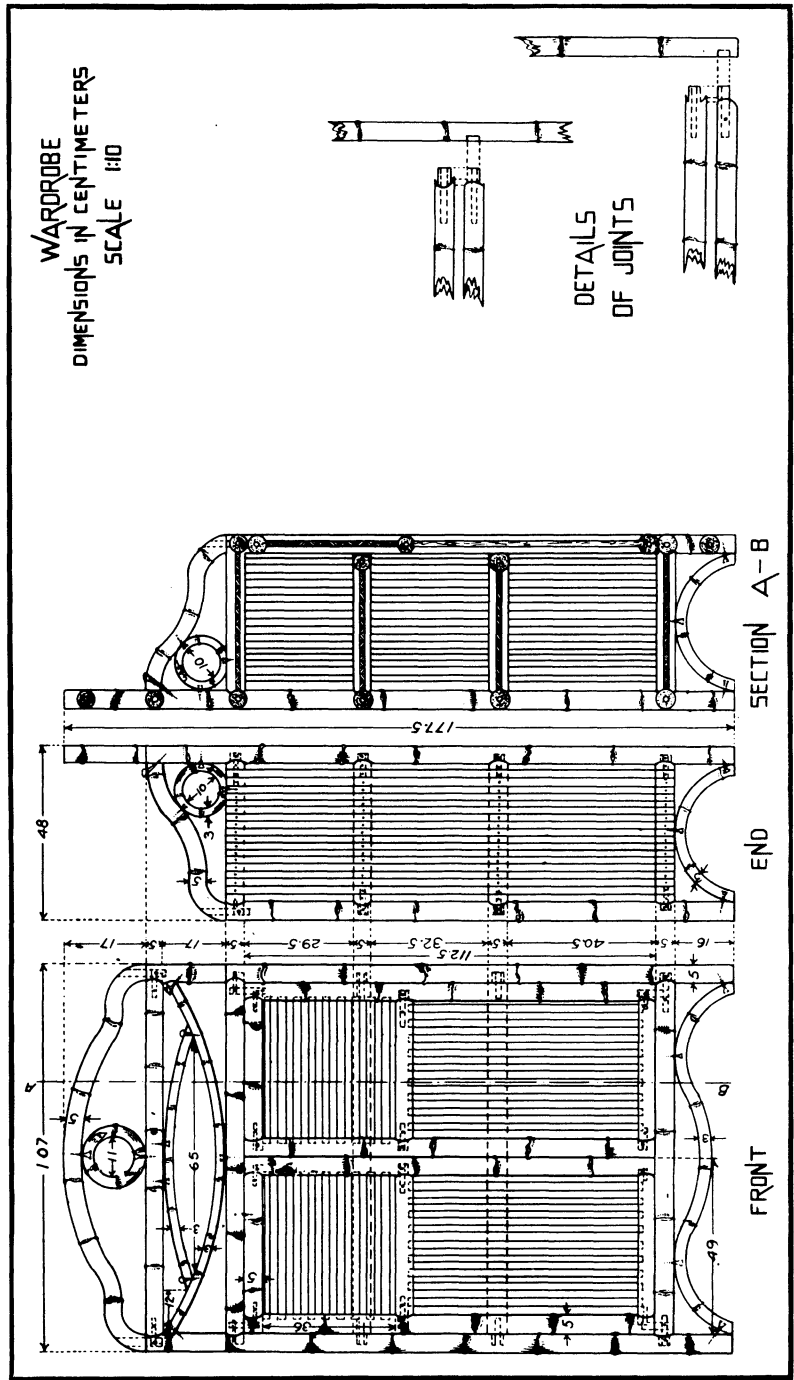
ENDS READY
TO RECEIVE
PLATE

PLATE
ATTACHED

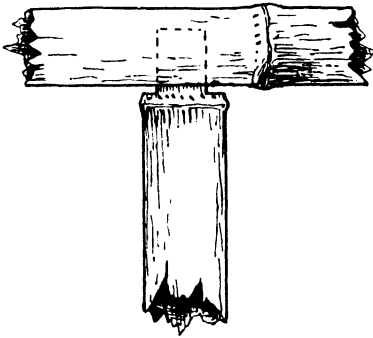
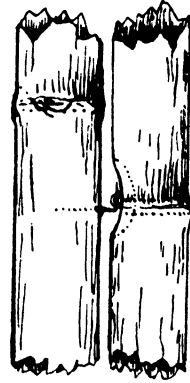


DETAILS OF JOINTS

Plate No. 12.



made of thin bamboo strips (the long jointed variety), carefully matched as to thickness and width. The shelving should be supported by cross braces extending from the inner front to the back rails, at a distance sufficient to prevent the shelves from sagging when they are weighted. The doors may be hung in one of two manners: By use of the hook and eye as here shown, one being placed toward the top and another near the bottom of the outer stile of either wing of the door, care being taken to plug the opening which may have been made

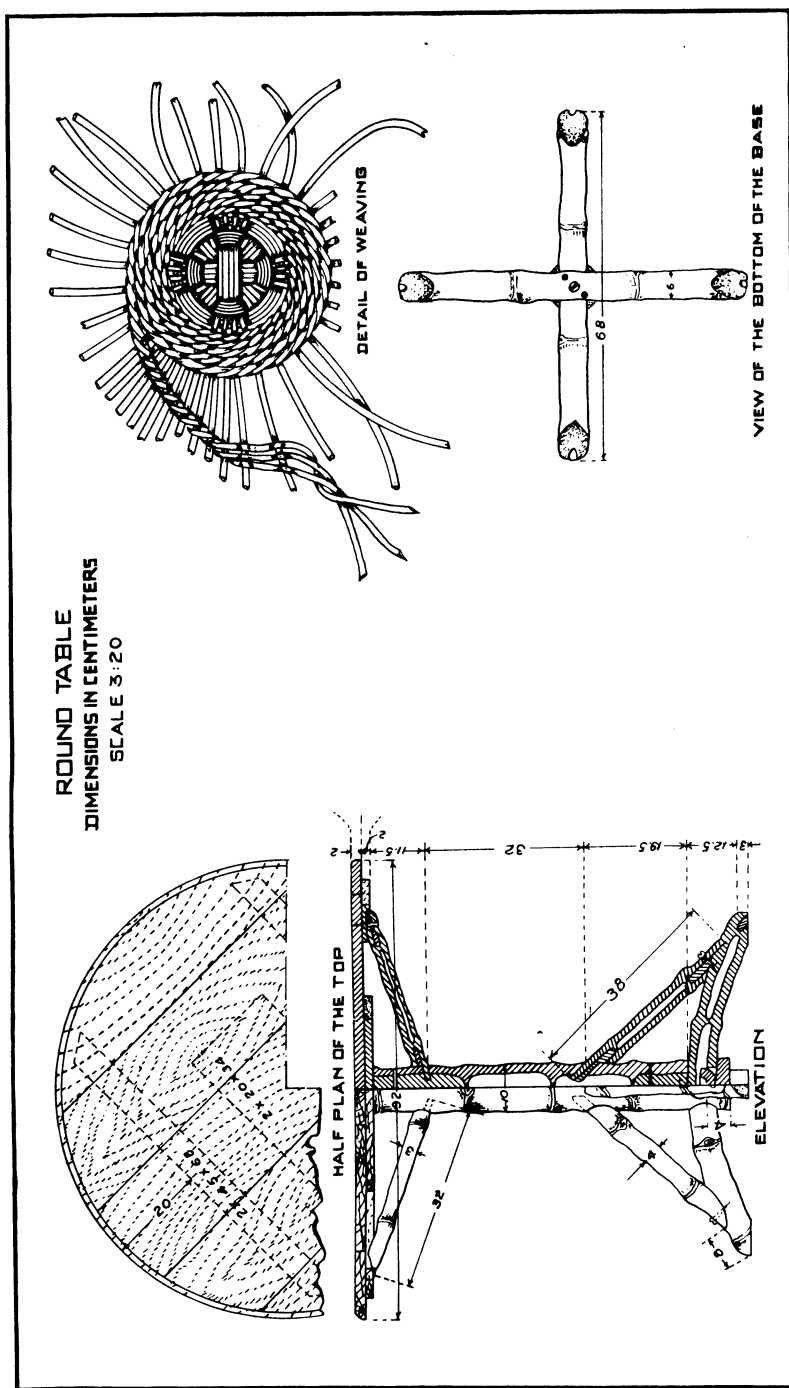


at the back of the ring chamber should this have been cut sufficiently deep to penetrate the hollow inner tube of the bamboo; or by a knob or round tenon left projecting at the ends of the door stiles and set loosely into a socket made in the upper and lower front rails of the wardrobe in the manner shown.

ROUND TABLE.

(Plate No. 14.)

This is perhaps the most difficult to make of all the pieces here described, but it is one of the most pleasing and satisfactory, if directions are carefully followed. A thick walled piece some 10 cm. in diameter should be selected for the pedestal and pieces about 6 or 7 cm. for the feet. The method of attaching these to the pedestal is as follows: First the cross pieces forming the feet are bent to the desired curve and fastened by cross lap joint. Then a section at the lower end of the pedestal is sawed off some 5 cm. from the extremity and the feet are fastened in position by a lag screw extending into the pedestal which has been previously plugged. The cap which has been removed from the lower end of the pedestal can then be replaced and glued in position. The view of the bottom of the base shows the feet attached to the pedestal with the cap yet to be fixed in place. The leg braces are fastened by mortise and tenon joints at the top and screwed at the bottom. Similarly, the bracing for the board undertop is fastened by mortise and tenon joints and screws, as shown in the



elevation drawing. The detail of weaving illustrates the method of starting the weave for the table top. The spokes are of oval rattan and the weavers are round, each about 0.03 cm. in diameter. The style of weaving is that known as triple weaving, from the fact that three weavers are used. As the weaving progresses, additional spokes should be inserted, as is customary in circular mat weaving of rattan. When the table edge is reached the spokes should be bent downward and under the table edge from 1 to 1.5 cm. and the weaving continued so as to allow a lap or short skirt to hang some 5 or 6 cm. beneath the table edge.

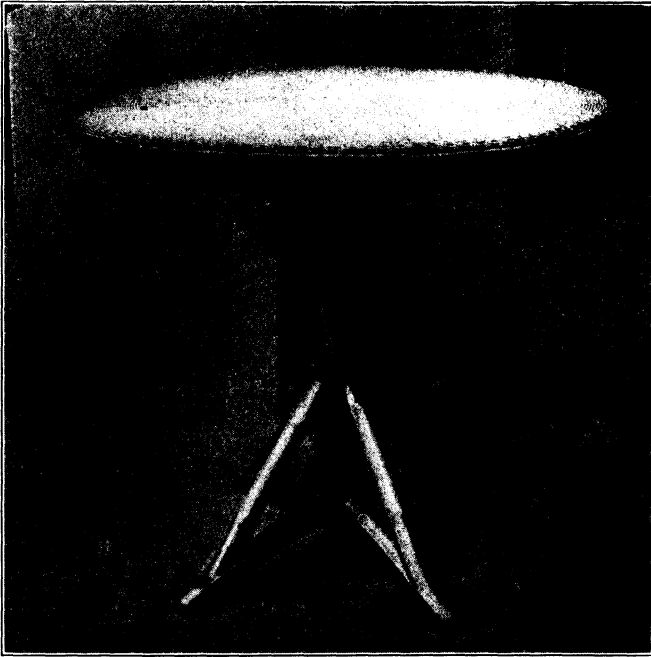


Plate No. 14-A. Round table.

One or two rounds of nito may be inserted in the lap or edge for ornamental purposes. Small brass brads should be used to fasten the rattan covering to the wooden undertop, so as not to show, and the edge of the covering should be finally held in place by a semi-circular piece of rattan running around the entire border and similarly fastened. This adds considerably to the artistic finish of the piece.

NOTE:—(1) Texts and Catalogues to be consulted and the purchase or acquisition of which is recommended:

Bamboo Work, by Paul N. Hasluck.

Industrial Studies and Exercises, Teachers' Edition (Appendix), by the World Book Company.

Bilibid Catalogue of Wicker Furniture, last edition.

(2) Nearly all these pieces of bamboo and rattan furniture have been worked out and successfully made by various primary shop teachers of Pangasinan province; to the same teachers should be credited the original working drawings accompanying this course.

(3) IMPORTANT.—When the actual work of construction is undertaken, teachers will find it desirable to have working drawings made from the plates previously shown in this article; each individual pupil needs the guidance and explicit working directions which such drawings contain.

The *Outlook* for August 17 contains an interesting article on "The New School-Boy," by Jane E. Robbins. The article is brimful of the most advanced thought and common sense ideas relative to what should be the trend of the child's education. Every child has latent talent in some line and is good for something; and it is the duty of the school to furnish him at first with such diversified lines of instruction as may afford the teacher the opportunity of discovering along what special line the child's natural bent lies. Then when this has been discovered, cater to it and develop it. Constructive work—manual training (in the broad sense) leading to manual labor and invention—as the preparatory step to any vocation in life, technical or professional, is one of the key-notes of the argument. The cry of city-bred children for something to do—for an opportunity to engage in constructive labor of some sort—is beginning to be heard; and "boys are now to be found after school hours in shops and science rooms toiling gladly over their pet inventions."

"We have had with us for some time," the writer says, "the boy who longs to have his dinner pail and go to work; and he is at last coming into his own. [But even] if the boy who has done good blacksmithing and has learned the ways of a dynamo before he is sixteen should become, later in life, a lawyer or professional man instead of a blacksmith, he still has the advantage of understanding something of the physical world and of the feelings of a good workman. He carries into his new profession the moral training which comes from doing a bit of plain work in honest fashion, and his experience with machinery of the school shop keeps him from the ignorance of modern conditions expressed by the literary college graduate who said that he supposed ampères were bought by the bushel."—J. D. D.

PHILIPPINE MATS.

By HUGO H. MILLER, JOHN F. MINIER, U. S. ANDES, THEODORE MULLER and Mrs.
ALICE BREZINA.

(Continued.)¹⁰

PANDAN STRAWS.

DESCRIPTION OF PANDANS.

Pandans or "screw-pines" as they are sometimes called are readily recognized by their characteristic appearance.¹¹ The common forms occasionally planted in pots as house plants and in gardens, or more often found growing wild, have long and rather narrow leaves always supplied with more or less sharp spines which run along both their margins to the very tip. Another row of spines is present on the under surface along the midrib. Bearing in mind this middle row of spines it is impossible to mistake the leaf of the pandan for that of the pineapple or maguey which it resembles more or less in form and shape. Another very prominent feature of pandans is the presence of air or prop roots which grow from the stem above the ground and are helpful to the plant in various ways. The veins of the leaves always run parallel and in a longitudinal direction. The leaves are never borne on a petiole, but are attached directly, in winding corkscrew fashion, in ranks of three, to the stem.

Pandans are true tropical shrubs or trees. Although also found in the subtropics of Australia they never occur in other temperate regions except when raised as ornamental plants in greenhouses. Even their distribution in the tropics is limited, as they are found growing wild only in the tropical regions of the Old World, especially on the islands lying between the mainland of Australia and southeastern Asia. They are hardly ever cul-

¹⁰ This is the second part of the article on Philippine Mats, which was begun in the September Craftsman. It will be concluded in the November number.

¹¹ Due to the efforts of Elmer D. Merrill and A. D. E. Elmer, Botanists of Manila, aided by Prof. Martelli, of Florence, Italy, our knowledge of Philippine pandans has been greatly broadened. It is hoped that interested parties into whose hands this paper may come will help to extend it by sending specimens of pandans for identification to the Bureau of Education, Manila. Such specimens should consist of the ripe fruit and of at least two full grown leaves from which no spines or tips have been removed, and which have been cut from the stem as closely as possible.

tivated, for where they do occur they are found in more than sufficient quantity for the purposes to which they are put. They are essentially seacoast or open swamp forms, generally found at low altitudes and appearing to find a moist, warm climate most congenial to their growth. In the Philippines they occur in all provinces, though not always in sufficient quantity to make them of commercial importance.

The structure of the pandans presents many exceedingly interesting characteristics well worth noticing. Some plants are very low with leaves not wider than a blade of grass, while others form large trees with leaves many meters long and several decimeters wide. Spines generally occur along the whole margin of the leaf, though in a few forms, especially in cultivated varieties, they may be present only at the tip or may be wanting entirely. The marginal spines usually curve forward and vary in size from small, hardly perceptible forms, to large sharp conical structures. At times they are set very close together; again they may be several centimeters apart. Those on the midrib most often curve backwards and may vary the same as the marginal spines. Generally the spines are green in color though in some species they are pale-green, red, black or white.

Some forms seem to creep along the ground, while others, low and bushy and standing close together, form, with their numerous supporting prop roots, an almost impenetrable jungle. The high tree forms are very striking because of their peculiarly shaped crowns.

The first roots which the pandans develop soon disappear and their place is taken by others. Starting high above the ground, these grow at an angle from the stem and generally reach the soil. They serve the twofold purpose of supporting the stem and of supplying it with sufficient air. If, by accident, the underground roots die off, the plant relies entirely on these air and prop roots for support and food. The strong prop roots are generally of the same diameter throughout, though sometimes they thicken at the ends. Normally they never branch above the ground, but after reaching the soil very often divide. The tip of the roots is protected by a cap, while a layer of cork tissue prevents the drying out of the root body.

The pandan has two kinds of flowers, male and female. The male flowers are arranged in the form of a spike protected by a modified leaf called the bract. They are white in color, crowded together on the spike and consist of stamens which hold the pollen. The flowers do not have the showy colored bracts which forms so prominent a feature in those of many other plants.

The female flowers consist only of the necessary parts. As the pollen occurs in enormous quantities and as the plants generally grow in groups, it is very probable that some flowers are pollinated by the wind. The fact that many pandans have very fragrant blossoms makes it almost certain that in the majority of cases insect pollination takes place. In a few forms that have a very disagreeable odor, pollination is effected by night flying insects.

The fruit commonly has the general shape of the female inflorescence, but as it matures it increases greatly in size. Pandans have a composite fruit made up of smaller fruits called drupes. The most common forms resemble the pineapple with its leafy fruit apex cut off. As is natural, variations from this type occur. Cylindrical, eggshaped, jakfruit-like forms are quite common. The largest may be 60 cm. long and weigh 25 kilos, the smallest only 7 cm. in length and 60 grams in weight. The fruit may occur solitary at the end of a branch, or in groups. The color is green, though some species change to a bright red before maturity is reached. The fruit may have drupes ranging from 12 mm. to 14 mm. in length and these may contain one seed or a number of seeds. At maturity the drupes separate and the fruit falls apart. If the plant occurs along the water, the seeds, when liberated, float about until they rest in a suitable place for germination.

USES OF PANDANS.

Pandans are valued chiefly for their strong fibrous leaves which are woven into mats, bags, and hats. Unless especially prepared, the soft plant tissue between the harder leaf fibers becomes dry and dirty and breaks in time; hence the ordinary pandan bag or mat can not be considered a durable article. However, when treated to a boiling process or when rolled, as explained for sabutan and the pandan of Majayjay, the leaves yield straw which is stronger and more durable than most palm or sedge straw used for the same purposes.

Pandan mats are important articles of domestic commerce in Malaysia, as it is estimated that four-fifths of the total population use them for sleeping purposes. In all places except where palms, like the buri, or sedges occur, they yield the most suitable and most easily prepared mat material. Generally the whole leaf is utilized after removing the marginal and midrib spines. The coarsest mats are used in drying out copra, cacao beans, paddy and such products. Pandan mats are made and used widely in the Philippines.

Formerly, before gunny sacks came into general use, coffee was packed in pandan bags and where pandans did not grow they were introduced and cultivated for that purpose. Even to-day bags from pandan play an important part in transporting sugar, coffee and other tropical products in and around southern Asia. Few pandan bags are made in the Philippines in comparison with the enormous quantity of bayons woven of buri straw and used to contain domestic rice and export sugar.

Pandans are used extensively for making hats in the Philippines as well as in other parts of the world. In several islands of the Pacific very fine ones are woven from straw consisting of the whole leaf cut into strips. In the Loochoo Islands imitation Panama hats of great strength are woven from the skin of a pandan, bleached and rolled into a straw. In the Philippines numerous varieties of pandan hats are produced, varying in grade from the fine and expensive sabutan to the coarse pandan.¹²

In some other places, as Burma, pandan leaves are woven or sewed into sails. In southern India they are utilized as umbrella covering. If no stronger material is obtainable, the leaves are placed on roofs as thatching, but they do not seem to lend themselves well to that purpose. In countries where they grow, they are often used instead of twine or made into ropes or hunting nets, or into drag ropes for fishing nets. They are said to be excellent paper making material. In some islands the fibers are separated from the leaf and used by the inhabitants in the manufacture of belts and aprons.

The wood of the tree pandans is too spongy and soft to make a good material for the construction of houses. Still, on small islands, such as the Coral and Marshall Islands, the natives construct their huts from pandan wood. Generally, it is used only for rough, temporary work. In some localities the soft interior part is removed to make water pipes. Again, because of its lightness, the wood is used by the people on the many islands of the Pacific to buoy their fishing nets.

Pandan roots are employed for various purposes. If sufficiently thin they are used, after being cleaned, for making baskets. The roots may also be pounded out, cleaned and made into brushes for painting or whitewashing houses. They are sometimes so employed in the Philippines. They are also used for cordage. A medicinal oil is sometimes obtained from them.

¹² Bulletin No. 33, Bureau of Education. Journal of Science, Manila, Vol. VI, Sec. C, No. 2.

The flowers of some pandans, especially those of *Pandanus tectorius*, are extremely fragrant. This plant is the most widely distributed of the pandans and is the most frequent pandan found along the seacoast and in low altitudes. Some botanists claim that the male flowers of this species have the sweetest odor known among plants. So powerful is their fragrance that by it sailors can often tell the presence of land before they actually see it. The natives in some places use the flowers in making an aromatic water, or, by distillation, a volatile oil, known as keura oil, which is used medicinally for rheumatism.

Certain pandan fruit is extremely oily and serves at times as a substitute for butter. The sap has the taste of sweet apples and is relished by the inhabitants in many islands. In some places it is even made into fruit jam.

The very young leaves, especially those surrounding the flowers, are eaten raw or cooked, and constitute an important article of diet when a famine sweeps India.

KINDS OF PANDANS.

THE COMMON SEASHORE PANDAN.

In a walk of half a mile or, at most, a mile along the beach of any of the seacoast provinces in the Philippines, one is almost sure to come across *Pandanus tectorius*. A map showing the distribution of this pandan would therefore be practically an outline map of the Islands. The species does not grow in nipa swamps, though immediately back of them it will be found well established. Neither could one expect to find it in localities where the cliffs come down abruptly to the sea, permitting only the existence vegetable life of the lowest form.

Pandan is its usual name in the Philippines. In Zambales it is called "panglan" or "panglan babai." Another name is "pangdan."

The stem is not very strong, and reaches a height of from 3 to 6 meters. It is generally supported by aerial roots. The leaves

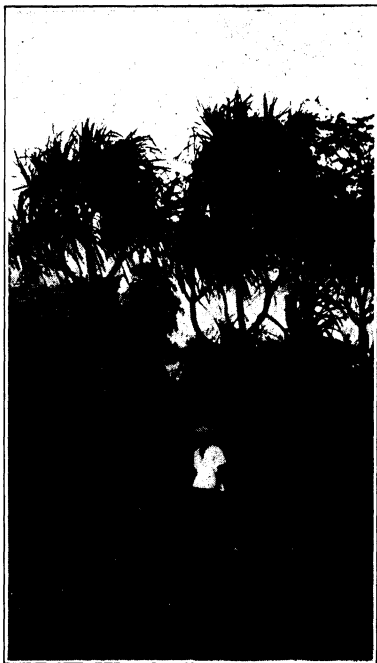


Plate XXXIV. Common pandan along Pasay Beach, Rizal.

are of medium thickness, on the average 1.35 m. long and 6 cm. wide. They are provided with strong sharp spines about 5 mm. in length. These are curved forward and are as much as one centimeter, or a little more, apart. The spines on the under surface of the midrib are shorter and farther apart, but bend in the same direction. The male flowers form a spike and these are surrounded by very fragrant leaves called spathes. The fruit is 20 cm. long, 18 cm. wide, and contains from 50 to 80 drupes, each about 5.5 cm. long and 2.5 to 3 cm. wide. The upper half of the drupes are free but close together. There are small fur-

rows on the tops of the drupes, rather deep but not very distinct. When ripe the fruit has a fine red color and the drupes fall from the head.

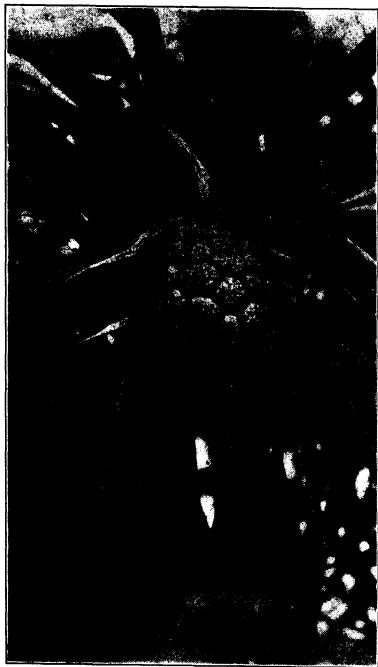


Plate XXXV. Fruit of the common pandan.

Pandanus tectorius is of considerable importance in nearly all parts of the world where it grows, and it is devoted to most of the uses already noted for pandans in general. In certain places, large industries are founded on it. In India, the leaves are cut every second year and made into large bags. Hats are produced from it in the Pacific Islands, those from the Hawaiian group being especially well known. It is probable that the imitation Panama hats of the Loochoo Islands are also woven from a material (raffia) prepared from the common pandan. In the Marshall Islands it

is recorded that forty varieties of this species have been evolved in the course of planting and cultivation for industrial purposes.

From the information submitted with the specimens received in the Bureau of Education, it is to be judged that the economic importance of the common pandan in the Philippines is of but little consequence. Though widely used, no large or even local industries are based upon it. A scattering production of hats, mats and bags is reported in Abra, Union, Zambales, Mindoro, Bulacan, Rizal, Batangas, Sorsogon, Iloilo, Antique, Oriental

Negros, Cebu, Leyte and Sorsogon provinces. Near Badoc, Ilocos Norte, and along the Abra border the Tinguian people make mats from an upland variety for local trade. In Balayan, Batangas, the leaves are used for thatching. In Surigao they are also made into baskets. In most processes the preparation of the straw consists of cutting the leaves into strips and drying them. In Zambales, however, it is reported that the leaves are flattened, pressed, split, and rolled. In Mindoro, they are soaked in water and dried in the sun before being cut into straw. It is probable that much better material could be prepared from this pandan if such processes as are used in the making of sabutan straw and straw from the Majayjay pandan were followed.

Judging from the results obtained in other countries it would seem that if suckers of the common pandan were taken in the districts in which it grows, planted, and cultivated, varieties would result which would be much better adapted for industrial purposes than the parent stock. Indeed it is probable that sabutan, the Philippine pandan of greatest economic importance, is a variety which is the result of generations of planting, still closely resembling *P. tectorius* but differing from it in its leaves which are thinner, longer, of finer texture and of greater strength. It is possible also that sarakat, the economic pandan of the Bangui Peninsula, Ilocos Norte, is a variety of *P. tectorius*.



Plate XXXVI. Sabutan at Tanay, Rizal.

VARIETIES OF THE COMMON PANDAN.

SABUTAN.

Botanical.—It is a question among botanists whether the pandan known as sabutan is a variety of the common sea-shore pandan (*P. tectorius*) or whether it has sufficient distinctive characteristics to entitle it to be considered as a separate species (*P. sabotan*). Botanists have not as yet succeeded in securing a fruit of this pandan, which could settle the question, and it is

very doubtful whether the fruit will ever be found.¹³ Prof. Ugolino Martelli of Florence, Italy, an authority on pandans, considers sabutan to be *Pandanus tectorius* var. *sinensis*. This classification is for the present accepted, as most evidence is in favor of such determination and in this paper sabutan is therefore considered to be a variety of the common pandan, the chief change in which, through generations of planting, has been in the production of a leaf, stronger, thinner, and of finer texture than that of the parent stock.

The sabutan plant is never found growing wild though after it has once been started and rooted it will endure neglect and even

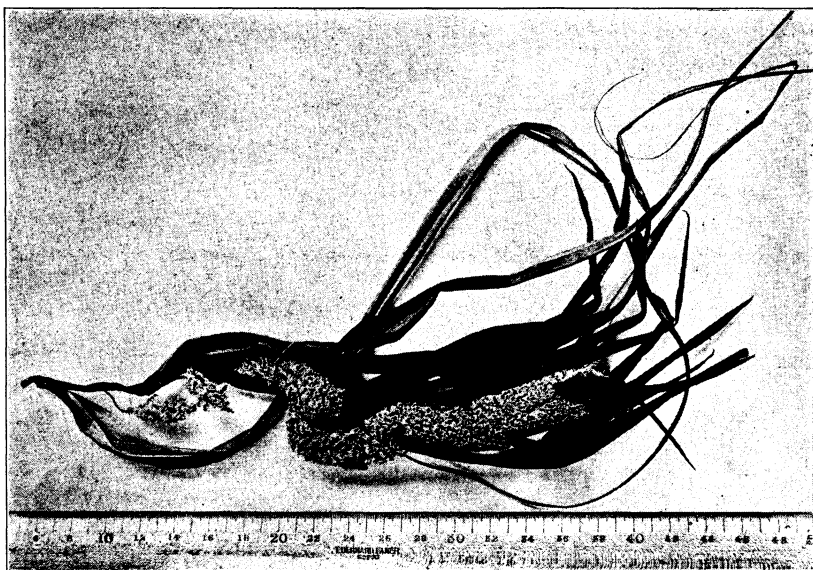


Plate XXXVII. Flower of sabutan.

abandonment. It produces better and finer leaves, however, if it receives some care and attention. In the towns of Tanay and

¹³ To settle, if possible, the question of whether sabutan flowers and fruits, inquiries and investigations on the ground were made in Tanay and Pililla by a representative of the General Office of the Bureau of Education. The people interviewed in these towns were positive in their statements that they had never seen the fruit of this pandan though they did remember seeing the flower. Every possible effort was made to get accurate, reliable information. An old man was engaged as guide and a male inflorescence of sabutan was found in a patch located on a hillside, under the shade of trees and surrounded by considerable underbrush. The patch, according to the statement of the old man was older than he could remember; the age of the guide was, perhaps, between sixty and seventy years. The flowers were odorous and covered with small brown insects almost hiding the inflorescence.

Pililla, Rizal Province, and in Mabitac, Laguna Province, and in all the towns along the lake shore as far as Paete, the suckers of the plant are set out in small plots of ground surrounding the houses of the people. These form patches which in several years (depending mostly on soil conditions) yield pandan leaves large and fine enough to be used in the manufacture of hats and mats. The ideal location for sabutan is along the banks of streams where it can get the benefit of the light shade of bamboo or plants that happen to grow in the vicinity. Ordinarily, good results are obtained by planting the suckers of sabutan in a loose, and moist, but well drained, soil. Plants are set out one meter apart in every direction, as they spread considerably. They need some shade, especially when young, but not the heavy shade of an abacá or banana grove.

The plant grows to be from 2 to 4 meters high. The leaves are fine in texture, about 2 meters long and as wide as 6 centimeters. Spines occur on the margins and on the under surface of the midrib. The male inflorescence procured from Tanay by the Bureau of Education is similar in appearance to that of *Pandanus tectorius* and is about 27 centimeters long. At varying distances on the flower stalk are leaves (bracts), thin and fine, from 10 to 24 centimeters long and with fine spines on margins and midrib. The flowers have a pleasant though not very strong odor.

Status of the sabutan mat industry.—As an industry, the weaving of sabutan mats is confined to the towns of Tanay and Pililla, in the Province of Rizal. The beginnings of this industry go back beyond the memory of the oldest inhabitants or even of their parents. It is probable that, as the people state, mat weaving has been carried on ever since the towns were founded. Tanay is the older of the two and it would seem (though reliable historical data of this kind are difficult to obtain) that the town was the first to engage in sabutan mat weaving and is probably the mother of all the sabutan industries carried on around Laguna de Bay.

The present condition of the mat weaving industry of these two towns, however, is precarious; it appears to be gradually dying out. The fabrication of sabutan hats has been introduced from Mabitac, Laguna Province, into Pililla, with the result that the younger generation is entirely engaged in making hats and the relatively small number of mats produced is being woven by the older women who have not cared to learn the new art. As yet no hats are made in Tanay, but the work is being taught in the schools and from conversation with people of the town it is judged that they are becoming interested also.

The disappearance of the sabutan mat industry would be very unfortunate, for the products are the finest samples of the mat weaver's art produced in the Philippines. The mats are of fine straw; the natural gray of sabutan is pleasing; the designs used are good and the colors are usually well combined. The favorite patterns consist of heavy plaids with some of the stripes containing sub-patterns produced by floating straws; the simplest ones have narrow border designs in straight lines. The most expensive mats are decorated with embroidered designs. The combination of colors in these are sometimes not pleasing and the designs themselves are not of special merit. However, if better ones are substituted, these mats should be excellent for a foreign trade demanding expensive articles of this nature. Unlike most

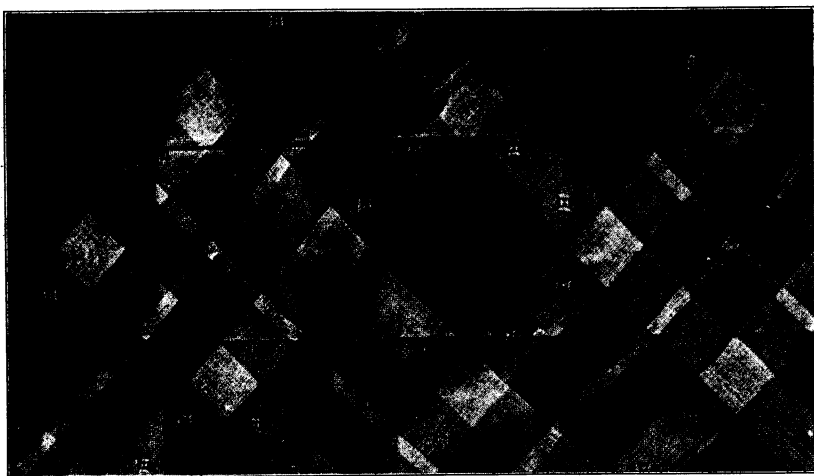


Plate XXXVIII. Cheap sabutan mat.

Philippine mat industries, this one has not as yet been affected by coal tar dyes, and only vegetable dyes, found locally in the town or in the forests, are employed. The straw dyes very well and as a consequence the colors produced are even throughout the mat; nor have any of the shades that brilliant effect or "off color" which is so distasteful in certain fibers. The colors obtained are only fairly fast in the light, however, and it is probable that the new coal tar dyes will be faster and cheaper. In point of durability, sabutan mats would be superior to all others produced in the Islands if woven of double straws. In price they now vary from forty centavos to thirty pesos, the ordinary ones bringing from ₱1.50 to ₱2.50.

If the industry is to be preserved intact, however, something must be done to give it vitality, for the weavers know from

experience of neighboring towns that more money can be made from weaving hats than in the fabrication of mats, and they will naturally change to the more remunerative article. Unlike most other weaving industries, the craft has not as yet been organized in Tanay. The production of mats has been more or less haphazard, with but little supervision by any person resembling the broker usually connected with household industries. The weaver on completing a mat sells it in the market or to some storekeeper. Up to the present time, the chief trade in these mats has been at Antipolo in May during the "romeria" or annual pilgrimage to the shrine of the Virgin of Antipolo. Certain persons in Tanay have made it a practice to gather up a store of mats and take them to Antipolo for sale there during the fiesta. A few of them are on sale in Manila and in neighboring provinces. Of late, however, persons have appeared who are taking up the industry more thoroughly as brokers and it is to be hoped that the workers will be organized into some better system for production than now exists. There is a large opportunity not only for supervision but also for division of labor. At present the men of the house cut the leaves, and each weaver (all the weavers are women) carries out the rest of the process. There would be a considerable saving of time if certain persons devoted themselves to the preparation of the gray straw, and the dyeing was left entirely to certain other workers. In this way the weavers of the mats would be engaged only in the actual fabrication of the article and much time would be saved to them.¹⁴

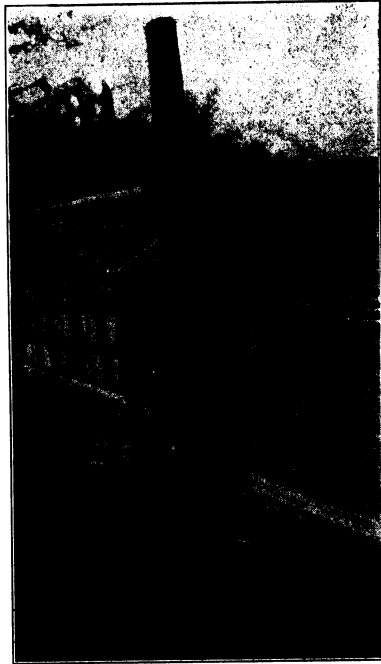


Plate XXXIX. Smoothing sabutan, Tanay, Rizal.

¹⁴Plain double pandan mats, the material of which resembles sabutan, are imported from Singapore and sold by Chinese storekeepers in Manila in large quantities. They are roughly made and the fact that they are double permits the unfinished edges to be turned under and sewed down with coarse red cotton twine. They sell for a little less than the plain, single, Tanay sabutan mats with finished edges.

Planting, maturing and yield of sabutan.—The plants from which the straw mats at Tanay are made are set out in plots near the houses of the workers. The suckers are planted in April at the beginning of the rainy season, and, while it is always stated that straw prepared from the leaves grown in the shade is best for weaving, yet the plants are never intentionally set out in the shade but are planted wherever an unoccupied plot of ground is obtainable. As a matter of fact the patches to be seen in the sabutan towns grow in a semi-shade such as one would expect to find in yards where the usual ornamental and fruit trees and banana plants grow. Much of the sabutan is in the sun from morning to night; some is shaded during all or part of the day. The suckers mature leaves in the third year¹⁵ but these are cut off and thrown away as useless and it is not until the fourth year that the lower leaves can be stripped into straw. Harvest takes place every four months, five or six leaves being obtained from a plant at each cutting. The plants are never irrigated but it is to be noted that the soil around Laguna de Bay is very moist and that the water table is close to the surface with a good seepage from the hills which are near the shore. It is probable that the plants differ in their production of leaves because some have many more branches than others and the climatic and soil conditions affect the yield.

Preparation of the straw.—The best straw is prepared during the dry season, because at this time there is sufficient sunshine to produce a good colored material. As a consequence the workers prepare a large quantity at that season and store it in or under their houses, wrapped in mats.

The leaves used are about 2 meters in length and 6 cm. in width. The central thorns on the back of the leaves are removed by cutting away the midrib. Two lengths about an inch in width are thus produced from which the outer rows of thorns may or may not be removed according to custom. The lengths thus obtained are left in the sunshine and wind for about half a day to render them more flexible, after which they are cut into straws. For this purpose there is used an instrument consisting of a narrow wooden handle about $2\frac{1}{2}$ cm. wide at the base, into which narrow sharp teeth, usually of steel, are set.

¹⁵ It is very difficult to obtain definite information with exact figures. These statements were made by a woman expert in weaving mats, and owing to the frank answers to the questions put, her information seems more reliable than that of the usual weaver interviewed. Other persons state that from two to six leaves are taken from a plant every month.

Brass and even hard woods can be used for teeth. The point of the segment being cut off, the base is grasped in one hand, the inside of the segment being turned toward the operator. The comb-like instrument is forced into it about 4 cm. from the end of the base and the teeth are held against the first finger by pressure of the thumb. The leaf length is then drawn up by the other hand and is cut into straws depending in width upon the fineness of the comb used. If the leaves are too young they will break in this process. The stripped segments are then usually tied up into bundles as large around as the fist, and hung in some shaded place exposed to the wind. The length of time occupied by this process varies. In some places it is omitted, though it seems to be always carried out in Tanay.

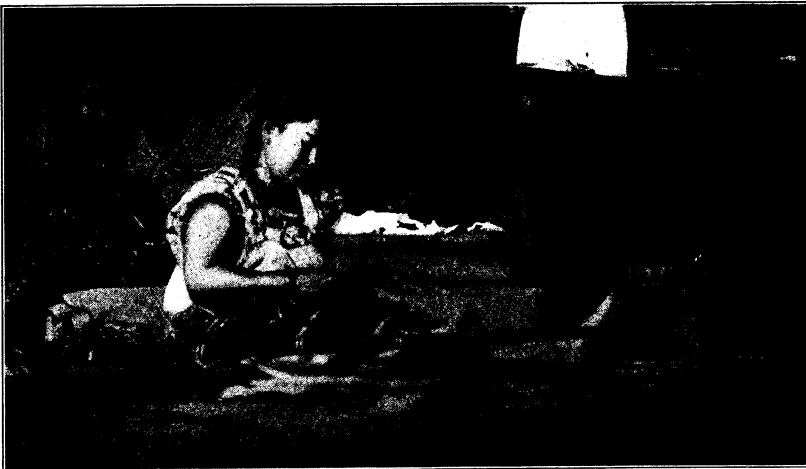


Plate XL. Weaving sabutan mat, Tanay, Rizal.

The bundles are then undone and the worker, holding the uncut base of each length in one hand, runs the straw between his fingers and the sharp edged ruler-like piece of bamboo held in the other. This is done several times and results in the removal of considerable moisture, the prevention of wrinkling and greater pliability of the straw.

There are several variations in the processes followed for boiling sabutan. In the Province of Laguna a fistful of the stripped lengths with bases still attached are rolled up into a bundle and placed in fresh water in order to remove the coloring matter—in some places in clear, running river water, in other places in a can of clean, fresh water—for about twenty-four hours; the water is changed several times. In the last method the process is discontinued when the water remains clear. Bun-

dles are then placed in cold vinegar, water or lemon water to which green tamarind fruit has been added to make the color of the straw lighter and to toughen it; the water is brought to a boil. Bamboo is used as fuel as that fire is not so hot as a wood fire. The length of time required for cooking differs. One good authority states that it should be stopped when the odor of sabutan can no longer be detected in the vapor, which occurs after about fifteen minutes boiling. This authority also states that the straw should be removed when it takes on a reddish hue. Many women put the straw into clear boiling water to which nothing has been added. After this process the straw is allowed to cool, is washed several times in clean, fresh water and is spread in the sun to dry, whereupon it assumes a gray color. If there is no sun the cool straw must be kept in fresh water which is changed every twelve hours until the sun appears. If a greenish shade is obtained the process has not been correctly carried out. Straw from dark green, thick, old leaves, or from those grown in the sun, is often reddish brown in color.

The boiling processes noted are those used in the preparation of straw for mats. The process followed in Tanay has been described by Mr. Amado Simpoco, principal of the Tanay Central School. The stripped lengths after being wilted and drawn over the sharp edged piece of bamboo, are made up into fist bundles, tied at the middle and placed in a large copper pot 61 cm. in diameter and 84 cm. in depth and containing about 25 bundles. The pot is filled with water and the sabutan is boiled for 24 hours, care being taken that the straw is always covered. After boiling, the bundles are removed and untied and the strips are hung in the shade or in the house to cool; afterwards they are placed in the river for a day and are then washed carefully and dried thoroughly in the sun. The gray straw thus obtained is stored in bundles, still attached to the uncut bases, and is left in the air for three or four nights before it is woven into mats.

Dyeing sabutan.—Mr. Simpoco has also made a careful study of the methods used in Tanay in dyeing sabutan straw, and the results of his efforts are presented here.

Red orange: For the production of red orange straw the gray material, prepared as outlined above, is first treated by steeping in water containing kolis leaves and twigs. The leaves and chopped twigs are pounded in a mortar and are placed together with the sabutan in a large receptacle capable of containing from 25 to 30 bundles, filled with water. The material is allowed to remain in the receptacle for four days. Early in the morning of the fifth day the straw is removed and hung in a shaded

place until dry and is made up into bundles tied tightly at the larger end.

The dye fluid is carefully prepared. Chips of sappan are boiled in a large copper pot for one day. A quantity of turmeric roots and annatto seeds are pounded separately in mortars until they are reduced to a very fine state. These are then separately treated with water and pressed, the result being a turmeric water and an annatto water. These two are mixed and poured into the boiling sappan. After about 25 minutes the bundles of sabutan are placed in the pot and the whole is allowed to boil until every part of the fiber is uniformly colored. After having been boiled sufficiently the bundles are removed and placed in a large basket, later to be dried in the shade. They are left in the night air for three or four nights and are then rolled up in coarse mats. The shades procured vary with the proportions of the dye materials used. Some are a decided orange, others are light yellow.

Yellow: Yellow straw is produced in the same manner using turmeric and annatto only.

Red: In the production of red straw the bundles are treated with kolis leaves in the same manner as in the preliminary process for red-orange straw. Into a pot capable of holding 25 fist bundles of sabutan, four gantas¹⁶ of finely chopped sappan are placed. Over this are placed 15 bundles of the straw which in turn are covered with one ganta of chopped sappan. The remaining 10 bundles are then added and covered with still another ganta of sappan. The pot is filled with water and set over a fire for from twelve to fifteen hours. Care is taken that the bundles are always kept under the water and that all parts of the material are uniformly colored. The loss by evaporation is counterbalanced by adding water from time to time. When well colored, the straw is removed from the pot and placed in a large basket for a day and is then hung in the sunshine to be dried. It should be allowed to remain in the night air; when thoroughly dried it is rolled in coarse mats.

Black: Black straw, a warm dark gray, is prepared from the red material. Buds of bananas, leaves of kabling, talisay, camagon, and the castor plant are pounded in a mortar and are mixed with fine particles of black clay such as can be obtained from rice paddies. Sappan water, made by boiling sappan chips, is then added to the mixture and the entire mass is placed in a large receptacle for a day. Red straw is put into this mixture

¹⁶Three liters equal 1 ganta.

and allowed to remain for two days. It is removed on the third day and again returned to the mixture on the fourth day. On the fifth day the straw is finally removed and placed in the sun, being kept in the air at night.

Coal tar dyes are used in the production of green and purple straws. These are purchased from the Chinese stores. The prepared gray fiber is also employed with these dyes. The usual method of boiling in a tin can until the desired shade is obtained, is followed. The straw is dried in the sun and kept in the night air. Colors produced are not so uniform nor so

satisfactory as the others described and are seldom used.

Weaving the mats.—Before weaving the mat the worker runs the straw over the ruler-like piece of bamboo as already explained, and removes the uncut base to which it has been attached during the various processes of preparation, bleaching and dyeing. One side of the mat is first woven the entire length, and is finished by having the edges turned in. This edge is then placed in a slit made in a narrow stick of wood and is tied in place with strips of sabutan straw running around the stick and through the mat. The mat is allowed to remain attached to this stick until it has been completely woven. As weaving proceeds, the finished part is



Plate XLI. Pandan of Majayjay.

rolled up on the stick, thus being out of the way of the weaver. This arrangement also serves to keep the mat in position during weaving and prevents it from getting out of shape. Single straws are used and consequently the mat has a right and a wrong side.¹⁷ The most expensive mats, which are seldom made, are double and of very fine material.

¹⁷ Sabutan lends itself easily to the fabrication of pocketbooks useful as purses, card-cases or cigarette-cases. From it can also be made very pretty, strong, durable and useful handbags. The weaving of both of these articles has been taken up in the schools of Tanay, but it is not as yet commercial in the town. Sets consisting of a handbag and a pocketbook in the same color and design are attractive.

The spread and cultivation of sabutan.—For a number of years there has been an increasing interest throughout the Philippines in the propagation of sabutan. Teachers in various places have procured suckers from the towns along the east coast of Laguna de Bay, and have planted them out with the idea of having their own industrial material close at hand. Many of these attempts have been failures since not enough information had been obtained concerning the soil and moisture conditions necessary for the cultivation of the plant. The Bureau of Education has therefore gathered as much information as possible on the cultivation of sabutan, based upon the experience of various persons who have attempted planting it.

It has been found that, in those regions having a dry season, the suckers should be planted early in the rainy season so that they may become well rooted before the rains stop, or else water should be provided through irrigation ditches. In nearly all cases it has been reported that the loss of plants resulted from lack of water at the planting period.

It is reported that difficulty is found in making the suckers live if planted in the sun, but that, when well established, those so planted grow and produce suckers better. As has been previously noted no special attempt is made to set the plants out in either the sun or shade in the towns around Laguna de Bay, but all weavers state that leaves grown in the shade are the best for industrial purposes.

Sabutan plants need a moist but well drained soil. They should be set out about a meter apart each way (that is, the rows one meter apart and plants one meter apart in the row), since they spread out considerably when they become older. Where sufficient moisture does not exist, irrigation should be provided. If it is decided to shade the suckers, plants such as the papaya, having long roots rather than surface roots, are best. No sabutan plants should be planted within 6 feet of the papaya.

It is probable that with cultivation the plants will yield leaves suitable for straw in from one and one-half to two years, the time to mature depending upon the conditions noted in the preceding paragraphs.¹⁸

¹⁸Sabutan suckers may be purchased from The Luzon Floral Co., Manila at ₱5 per hundred, freight prepaid. In shipping, the plants are packed in baskets so that they can be easily handled. It is believed by persons who have received shipments from this source that the plants will remain in good condition out of the ground for a week or more during shipment. Hence it is not advisable for places more remote than one week from Manila to order any of these plants. For further information see Circular No. 82, s. 1911, Bureau of Education. It is probable that suckers can be obtained from the cultivated plants in about a year after they are set out.

Sabutan types.—In several places in the Philippines there are pandans which yield leaves similar to those of sabutan. It is probable that none of these are the true sabutan. The most important one is that growing along the northeastern shore of Tayabas Province. Mats are made at both Casiguran and Baler, and enter to a small extent, the interprovincial trade with neighboring provinces. It is stated, however, that these regions abound in the species of pandan from which the mats are made. Sabutan type mats are also reported made at Palanan in Isabela Province, and a trade is carried on in them with neighboring towns.

Other pandans reported under the name of sabutan and resembling it more or less have no commercial importance.

SARAKAT.

Sarakat is a distinctive pandan of the Bangui Peninsula of Ilocos Norte. The climate of this region differs from the rest of Ilocos Norte in that it has rainfall practically throughout the year, receiving as it does the benefit of the northeast monsoon which is cut off from the country to the south. It has not as yet been determined whether sarakat is to be described as a new variety of *P. tectorius* or is to be designated as an entirely new species.

From mats submitted to this office, it is to be judged that sarakat straw is as fine as sabutan. In fact, the material is so thin that even though the mats are woven of double straws they are no thicker, and are a good deal more pliable than all other commercial pandan mats, sabutan excepted, produced in the Philippines. The upper surface of pandan straw is glossy, and the under surface is rough. In making the double straw, the two rough surfaces are placed together so as to expose both glossy ones. Hence, unlike the sabutan, both sides of sarakat mats are similar in appearance. The material, however, is not so strong as sabutan.¹⁹

The mats are not decorated either by weaving in colored straws or by embroidered or border designs. In price they vary from about ₱1 to ₱2.

Mr. Petronilo Castro, formerly Supervising Teacher of Bangui, has stated that that town supplies most of the mats used by the people of Ilocos Norte. Some buri mats and a few "pandan" mats (probably from the common seashore variety) are made.

¹⁹ At this writing no data are at hand as to the preparation of sarakat straw, but it is probably made simply by drying. It is possible that much stronger and more pliable straw could be obtained if a process such as is used in the preparation of sabutan were followed.

The sarakat mats exceed those of pandan in numbers and in commercial importance and are more beautiful and stronger. The demand for the mats is great and many people are engaged exclusively in their fabrication.

THE PANDAN OF MAJAYJAY.²⁰

This pandan (*P. utilissimus*) is known in most places where it grows as "pandan" or "pandan totoo," the true or tame pandan. It is extensively used in Laguna and Tayabas and is remarkable for its very large leaves and its heavy fruit. The tree occurs in groups in dry ground but thrives best in half shade near streams. It attains a height of from 4 to 8 meters. The trunk branches toward the top and is supported by a few short and thick prop roots.

The leaves are often 5 meters long and 2 decimeters wide. The lower part of the older leaves stands up straight while the upper half droops. The younger leaves are erect with only their tips bent down. The leaf spines are short, blunt and conical.

The fruits look like the jak-fruit and are very large and heavy, being often 6 decimeters long and 2 decimeters in diameter and weighing at times 25 or more kilograms. The drupes ripen slowly and gradually; they are red in color when fully mature and possess a peculiar faint odor. It takes some time before all the drupes are shed, and in a grove of fruiting trees they can be found in all stages of maturity during the month of May.

P. utilissimus is found growing wild throughout the plateau region of Majayjay, Louisiana and Cavinti in Laguna Province, and extending into Tayabas Province. It is only the leaves from those plants which have been set out in plots, however, that



Plate XLII. Fruit of *Pandanus utilissimus* (Majayjay).

²⁰ Vol. I, No. 1 of the Philippine Agriculturist and Forester. A description of the plant occurs in Mr. A. D. E. Elmer's leaflets.

are utilized in the making of mats, hats and telescope baskets. Like sabutan, this pandan grows best in the half-shade near streams, and leaves grown in the sun are considered inferior. Nevertheless, no attempt seems to be made to select a locality for their propagation, and plots are planted wherever land is available. This pandan will not live in stagnant water and is particularly adapted to hill-sides where there is a constant flow.

The most satisfactory statistics on the propagation of *P. uti-*

lissimus are obtained from Cavinti, where the plant has been introduced within recent years and suckers are still being brought in from other towns. It is stated that suckers one-half meter in height mature in about three years, while suckers one meter in height or over will produce suitable leaves in one year or less. The most satisfactory results are obtained by transplanting the mature plants, since leaves are obtainable in a few months and in half a year suckers large enough for transplanting are produced. It is stated that in setting the plants out, the undergrowth is cleared away and the suckers are placed in the ground about $1\frac{1}{2}$ meters apart. Some attention is given to the



Plate XLIII. Rolling pandan, Majayjay, Laguna.

young plants such as loosening the earth around them; but as soon as they obtain a good foothold no cultivation is attempted.

Usually weavers own their patch of pandan from which the leaves are obtained for making the straw. Several workers sometimes have a patch in common and the few weavers who do not own pandans themselves must purchase. The leaves are sold on the tree, the purchaser cutting them off with a bolo. The price is from 20 to 30 centavos per hundred, depending

upon their size, softness, thickness and imperfections. The longest, thinnest, darkest green leaves, with the fewest imperfections, are considered the best and cost the most. In Cavinti where the leaves are imported from Louisiana and Majayjay, the price of the best leaves is 50 centavos per hundred. The estimates of the number of leaves yielded by a plant in a year differ considerably. By some it is stated that on the average one leaf is produced per month; others report that from three to five leaves are gathered in from three to six weeks.

The thorns are removed from the edges, and the midrib is cut away, thus reducing the leaf into two halves each of which is again divided. These strips are placed in the sun for half a day. The unique process in the preparation of this pandan straw is the rolling which occurs at this point. While it is probable that any roller with sufficient weight could be used, that employed in the pandan districts of Laguna is the primitive "iluhan" by which sugar-cane and copra is also crushed. It consists essentially of three heavy wooden horses, in the grooves of which a log, heavily weighted with stones, rotates. The pandan lengths are placed in one of the grooves underneath the log and so rolled. The object of the process is to make the material thinner and more pliable. Straw is stripped from the lengths thus prepared by the use of the gauge.²¹ The straw is then further dried in the sunshine and is ready to be woven. Sometimes the lengths are stripped before being rolled, so that the straw is left in the sunshine for another half day and then placed under the log in the iluhan.

Mats are woven in Majayjay and Louisiana only, the weavers of Cavinti devoting their entire time to the fabrication of hats. The mats are woven of single straw, but they are fairly thick and not at all limber. The number produced per week runs probably into the thousands, of which about 75 per cent are made of coarse straw and are intended for use in drying palay, copra, etc. These mats are known as "bangkoan," a word having about the same significance as "bastos;" that is, coarsely or poorly made. The finer and better made mats are intended for use as sleeping mats and for the floor. They are decorated with colored buri straw, usually in some shade of red produced by mordanting with kolis leaves and boiling with sappan wood as explained for buri straw. Occasionally, other colors are used, produced from the imported coal-tar ("Chino") dyes, but in all cases the shades produced are not very pleasing. The deco-

²¹ It is probable that the improved Andes stripper can be utilized in the cutting of pandan straws.

rations are embroidered in, and consist of simple borders in straight lines with an open center design of somewhat the same pattern. When first woven, the mats are usually of a dark green color. Before being sold, they are placed in the sun which changes them to a grayish color somewhat resembling sabutan. After long use, however, the final shade is yellowish green.

There seems to be but little division of labor in the production of these mats. Usually the whole family goes out into the patch and cuts the leaves, removing the thorns before bringing them home. Only women weave the mats. In Majayjay a few workers color their own buri straw used in decorating the mats, but for the most part this material is obtained from dyers, one a Chinese, the other a Filipino, who prepare it for sale.

The weavers are independent of advances by brokers and sell their product to Filipinos or to the representatives of Chinese merchants in Pagsanjan and Manila. A few weavers take their mats to Lukban whence they are distributed over Tayabas Province, but many more are gathered up by these brokers and sold in the market at Pagsanjan. The mat market there usually occupies one whole sidewalk running the length of the market building.

The pandan mats of Majayjay and Louisiana are notable for their strength and durability, and are excellent for the floor or bath. In price they range from ₱0.50 to ₱5.00. The usual price of the decorated mats is ₱1.50. The demand continues brisk and prices have recently risen. The weakest point in the mat at the present time is in the colored buri straw used to decorate it, for this tears long before the pandan shows signs of wear. If colored sabutan straw is substituted for the buri, a much stronger and probably more pleasing article will result.²²

KARAGUMOY.²³

The pandan *P. simplex*, known as "karagumoy" or "carogumoy," is the economic pandan of the Bicol peninsula in southern Luzon. It is usually found growing in well drained soil under the shade of banana and abaca plants and areca palms. It needs this protection because the leaves are easily broken or ruined by hard winds. The leaves are generally longer than those of sabutan (they are 2 meters to 3½ meters in length) and

²² Arrangements are now being made through the schools for the introduction of sabutan plants into the towns of Majayjay and Louisiana.

²³ Most of the information on "karagumoy" is taken from the report by Mr. Ralph E. Spencer, submitted to the Director of Education.

are but from 6 cm. to 10 cm. wide. They are very thick, being practically as coarse as the leaves of *P. utilissimus*. They bear stout spines on the midrib and along the margins, from two centimeters to three centimeters apart. A fungus disease often attacks them, causing dry hard patches, and not only spoiling the color but also making the material so brittle that it breaks in the preparation of the straw.

The plant is propagated by means of suckers in patches seldom over a half hectare in extent and often consisting of a few plants back of the house. The suckers are set out in rows and are probably one year old when the first leaves are taken, though the workers disagree on this point. At a certain given time, from eight to fifteen leaves are cut from the plant each year; at other periods, two or three may be taken from the same plants. Most of the leaves are harvested during the rainy season. Karagumoy leaves have a commercial value in many of the places in which the plant occurs. In Tabaco, Albay, women cut the leaves and carry them in large bundles to the market, where they are sold at prices usually varying from 8 to 12 centavos per hundred.

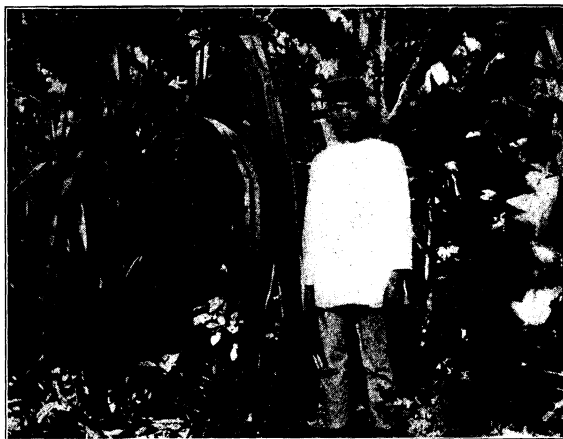


Plate XLIV. Karagumoy.

Throughout the Province of Albay mats are made from karagumoy, and in some towns the industry is of considerable importance. For instance, in the barrio of San Lorenzo in Tabaco, mats may be found in the making in nearly every house. In Sorsogon, too, the industry is widespread though not so important commercially. In Balusa the production is large enough to supply the local demand and leave a surplus for export to neighboring towns. In the Bicol provinces karagumoy is considered the best of all straws for the production of mats. In price the mats vary from thirty to ninety centavos, according to fineness.

In preparing the material, the spines and midrib are first removed and the leaves are divided into four strips of about equal

width. The straw is prepared from these with the knife and gauge; it is dried in the shade for a few hours and drawn several times over a piece of bamboo as explained for sabutan in order to make it more supple and smooth. The mats are woven in the early morning and at night, the straw being more pliable then. Attempts have been made in the schools to dye karagumoy but no success has yet been attained. The mats are plain.

BAREU.

The stem of this plant, *P. copelandii*, grows from 4 to 9 meters high. The leaves have an average length of 2.1 meter and a width of 8 cm.²⁴ Spines occur along the entire margin. Near the base they are comparatively coarse and from 3 to 4 mm. long. Towards the apex of the margins and midveins, the spines are short and close together like the teeth of a fine saw. From 3 to 5 heads generally form on the fruit stalk, each of them from 7 to 12 cm. long and 5 to 7 cm. across, at first pale yellowish in appearance but soon turning red. Their drupes are 14 mm. long and 3 to 4 mm. in diameter. This pandan is found in Cagayan, Benguet, Nueva Ecija, Samar, Bohol, Occidental Negros, Capiz, Surigao, Davao and other provinces.²⁵

This pandan is not of economic importance in central and southern Luzon. In the Bicol provinces it is used to some extent but it is considered inferior to other materials. In parts of the Visayas, such as Bohol, Capiz and Samar, it is utilized to a considerable extent, but cannot be considered of commercial importance. It is the economic pandan of Surigao, but even there its commercial importance is local only.

Table showing comparative measurements of certain Philippine pandans.

	<i>P. tectorius.</i>	Sabutan.	<i>P. utilissimus.</i>	<i>P. simplex.</i>	<i>P. copelandii.</i>
Height of trunk	3 to 6 m.....	2 to 4 m....	4 to 8 m.....	6 m.....	4 m.
Leaves:					
Length	1.35 m.....	2 m.....	5 m.....	2 to 3.5 m.....	2.1 m.
Width	6 cm.....	6 cm.....	20 cm.....	6 to 10 cm.....	8 cm.
Thickness.....	Medium	Fine	Thick	Thick	Medium.
Fruit:					
Length	20 cm.....	.....	60 cm.....	9 cm.....	7 to 12 cm.
Thickness.....	18 cm.....	.....	20 cm.....	9 cm.....	5 to 7 cm.
Drupes—					
Length	5.5 cm.....	.....	7 to 8 cm.....	3 cm.....	14 mm.
Thickness.....	2.5 to 3 cm.....	.....	2 cm.....	1 cm.....	3 to 4 mm.
Number in head ..	50 to 80 .....	.....	Many	Many	Many.

²⁴ The average was obtained by measuring accurately a number of specimens of the species sent in to the Bureau of Education from various provinces.

²⁵ Its most common name is bariu, spelled also bario, balio, balewe, baleau. In Occidental Negros it is also called balean, barog in Surigao, batin in Capiz.

PANDANS OF MINOR UTILITY.

The species *P. radicans* is reported as olango from Leyte, wañgo in Bohol, owañgo in Surigao and uyagño in Sorsogon. It is usually found growing along rivers and in marshes. The trunk reaches a height of 8 m. and its largest leaves may be 6 m. long and 12 cm. wide. There are from 6 to 10 dark brick red fruits in a cluster. The fruit is 14 cm. long and 8 cm. wide and contains 100 or more drupes. Each drupe is 2.5 cm. in length and 12 mm. in diameter. The leaves are made into straw from which coarse mats are woven.

Taboan is the name given to *Pandanus dubius* in Surigao while in Bohol it is known as bacong. It is a rare species. It is said to be a heavy, clumsy appearing tree with stem about 8 m. high, wide spreading branches near the top, and soft, pulpy and stringy wood. The flowers are grouped into an inflorescence. The male inflorescence, about 60 cm. long and partly covered by creamy yellow bracts, is erect and occurs at the end of the branches. The leaves are deep green in color on both sides, with an average length of 2.25 m. and a width of 20 cm. The drupes of this pandan are from 8 cm. to 13 cm. long and from 5 cm. to 8 cm. wide. The plant is utilized to a small extent in making mats.



Plate XLV. Weaving a karagumoy mat, Tabaco, Albay.

In the Tagalog speaking provinces of Bulacan, Bataan and in and around Manila, *Pandanus luzonensis* is called "alasitas." It is also called "pandan" but this name should be reserved for *Pandanus tectorius*. The former is restricted in its habitat to the provinces around Manila Bay, while the latter is found in most of the seacoast provinces of the Philippines as well as in other tropical parts of the world. *Pandanus luzonensis* attains a greater height than *Pandanus tectorius*, but has narrower leaves than the latter. The male flowers are borne in a fleshy, much branched inflorescence from 20 to 30 cm. long. Each

branch is partly surrounded by a broad thin bract, 8 cm. wide. Each individual flower has from 4 to 9 stamens. The whole fruit is about 20 centimeters long and contains from 30 to 60 drupes, yellowish red in color when ripe. Each drupe is from 3 to 4 cm. long, 2 to 2.5 cm. thick, and contains from 6 to 10 seeds. The straw from this pandan is of inferior quality, though it is said to be used in Bulacan for mats.

UNIDENTIFIED PANDANS.

Besides the pandans, the identity of which has been explained above, there are several unidentified specimens or varieties from which mats are made. It may be that some of these will be found identical with those already discussed when sufficient botanical material has been gathered to determine them.

In Isabela Province, a pandan known as "langu" having long, strong, thin leaves, is made into mats in Santa Maria, Delena and Bolasi.

Mats are made along the coast of Cagayan Province, in the Ilocano barrios of the towns of Claveria and Sanchez Mira, from a pandan known as "pataga." These are very coarse and thick and have an unusually shiny surface. According to Mr. Otto Harwood, the leaves vary in length from 10 cm. to 35.5 cm. and in width from 7.5 cm. to 15 cm. The straw is made by cutting the leaf into strips and drying them in the sun. Although the industry is yet small, it is developing.

A species of pandan is employed in the towns of Camalaniugan, Aparri, Gataran and Lal-loc in Cagayan Province for making mats. Locally they are valued at from 40 to 50 centavos, but in Isabela Province to which they are exported they sell for as high as a peso and a half.

The only municipality in Pangasinan province in which the making of mats has reached provincial and interprovincial importance is Bolinao. The species of pandan employed is not known. The mats are shipped to towns along the seacoast of Ilocos and Zambales Province by sailing vessels, and are sold in the local markets or to local merchants.

In Mindoro the town of Subang makes pandan mats which are shipped to Batangas, Cavite and Manila.

Two pandans, called lingo and baring were sent to the General Office of the Bureau of Education from Guindalman, Bohol. It was impossible to identify them as no fruit was included. They probably represent two new species. Lingo has a leaf 2.9 m. in length and of an almost uniform width of 5.5 cm. At 80 cm. from the tip, it is 4.5 cm. wide, then gradually becomes

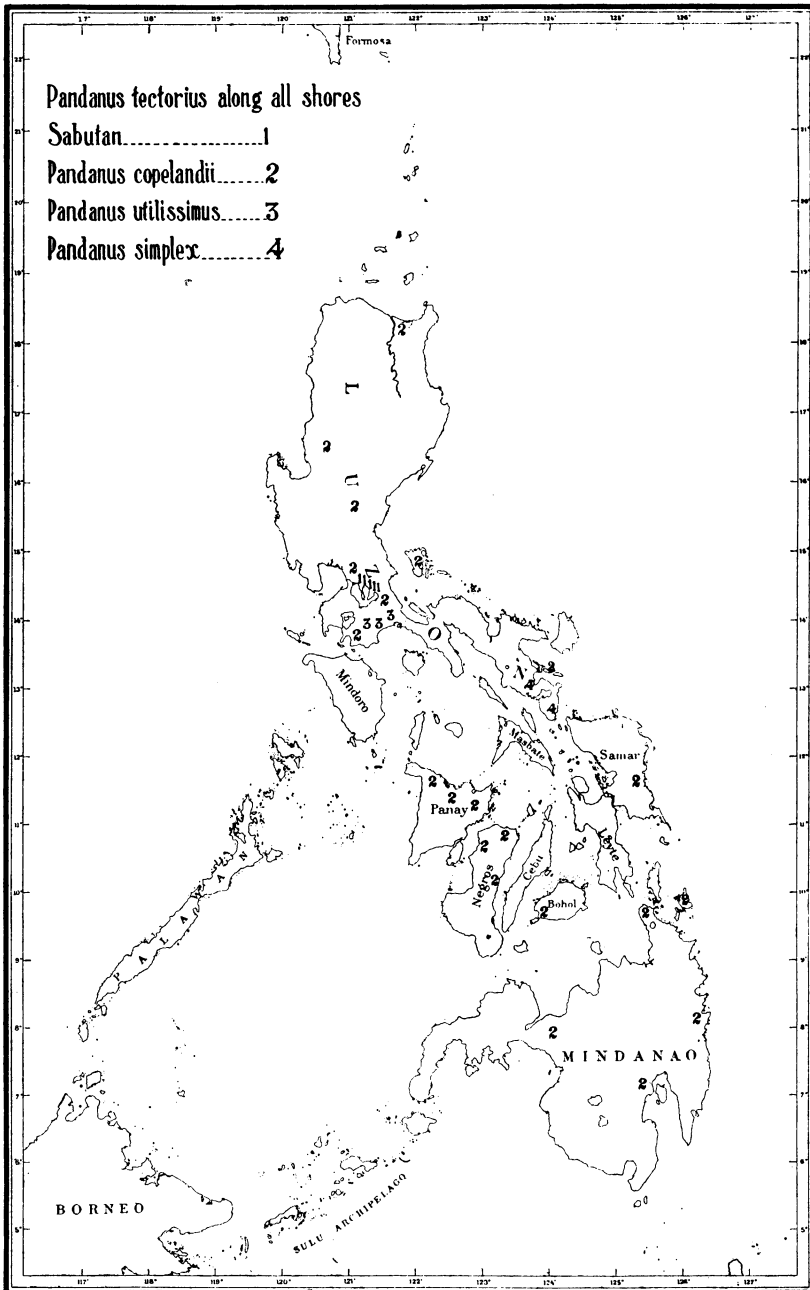


Plate XLVI. Philippine distribution of chief utilized pandans.

acuminate. The marginal spines are 2 mm. long, curved forward, from 6 to 8 mm. apart near the stem, but closer together at the distal one-third of the leaf. Spines of 1 mm. or less in length and 4 mm. or less apart, curved forward and extending throughout the length of the leaf, occur on the lower surface of the midrib only. The surface of the leaf is smooth and shiny. The leaf of baring is 72 cm. long, 2.8 cm. wide, apparently spineless, smooth and fine in texture. Both of these pandans would probably yield good industrial materials.

In Iloilo, the town of Banate has a pandan mat industry of interprovincial importance, whose product is an article of commerce as far as Negros. The mats sell at about 50 centavos each.



Plate XLVII. A Moro mat.

There is a large export of pandan mats from Dao, Antique, to the province of Iloilo.

Pandan mats are exported from Cuyo Island in Palawan. Some are sent to the mainland of Palawan and others to Antique.

The Moro pandan mats are the most richly colored of all those produced in the Philippines. At this writing, information is not at hand to determine the method of preparing the straw nor the species of pandan from which they are made. Mats which have been exhibited at successive Philippine expositions have undoubtedly been dyed with imported coloring matter. The designs are of the general effect of the mat reproduced on page 304. The colors are often well combined and the effect is very striking. The Cotabato mats are double; the under portion is woven of thick, heavy, uncolored straw, and the upper portion is of finer material; the two parts are spliced together.

SEDGE STRAWS.

KINDS OF SEDGES.

BOTANICAL.

The sedges which form the family of *Cyperaceae* are grass-like or rush-like herbs, with solid, jointless, usually triangular stems, while the grasses (*Gramineae*) are mostly herbs, usually with hollow stems closed and enlarged at the nodes. The former play an important part in the manufacture of mats because of their length and freedom from nodes. The family includes several genera of importance, viz: *Scirpus*, *Cyperus* and *Fimbristylis*.

Of these the *Fimbristylis* is the most important, for two species of *Fimbristylis* have a fairly large commercial use; they are therefore taken up separately.

Of the genus *Scirpus*, the species *S. grossus* known as "balangot" in Ambos Camarines and Capiz, "bagaas" in Occidental Negros, "tiquio" in Rizal and "bagui-bagui" in Capiz, and *S. erectus*, are used for mats. *S. grossus* is not a very suitable material for industrial purposes, its distinctly three-cornered stalk being too coarse in texture and too large to permit of weaving even a fair grade article. *S. erectus* is much better. The stalk is about as fine as tikug and grows to a height of 60 cm. The flowers sometimes occur in a solitary cluster, but more often from 2 to 5 clusters of spikelets are found on the side of the stalk near its top. The plant is widely distributed in the Philippines and inhabits open grass lands. It bears some flowers throughout the year. As yet only coarse mats are made from it, but its general appearance would warrant experiments along the lines of the processes by which tikug is treated. The only native names noted are "tayoc-tayoc" and "tikug" by which names the plant is known in Occidental Negros. These names, however, are more properly applied to other plants. *Scirpus mucronatus* is somewhat like *S. erectus* in general appearance. The stem of *S. mucronatus* is more robust and coarser in texture and attains a height of 80 cm. Its dried stem

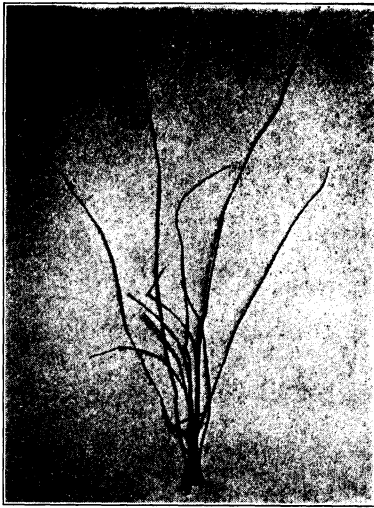


Plate XLVIII. *Scirpus erectus*.

has an average width of 4 to 5 mm., while that of *S. erectus* measures from 2 to 3 mm. The flowers of *S. mucronatus* appear in a very dense head on the side of the plant from 2 to 9 cm. from the top. Each head is made up of from 5 to 20 spikelets. These spikelets are from 6 to 15 mm. long, while those of *S. erectus* are never more than 1 cm. in length. The coarser stalk of *S. mucronatus* makes it a less desirable mat material than *S.*

erectus. In the Ilocos provinces a very coarse round sedge called tiker (*Scirpus lacustris*) occurs. It may be of value if split and dried in the sun so that it curls up into a round straw.

The genus *Cyperus* includes a number of economic plants, among them the Chinese matting sedge. The species most used in the Philippines is *C. malaccensis*. This plant has an underground stem which, as it continues its growth, sends out new stalks. The plant lives for a number of years and when fully grown is from 0.5 to 1.5 meters high. The stem is stout and three-sided in shape. It has few or no leaves, and when present the leaves are not more than 3 cm. long. From 2 to 5 leaf-like stems (bracts) not more than 20 cm. long occur under the inflorescence. The spikelets which make up the inflorescence are somewhat crowded together; they are very narrow, from 1 to 2 cm. long. The plant occurs in the Philippines in brack-

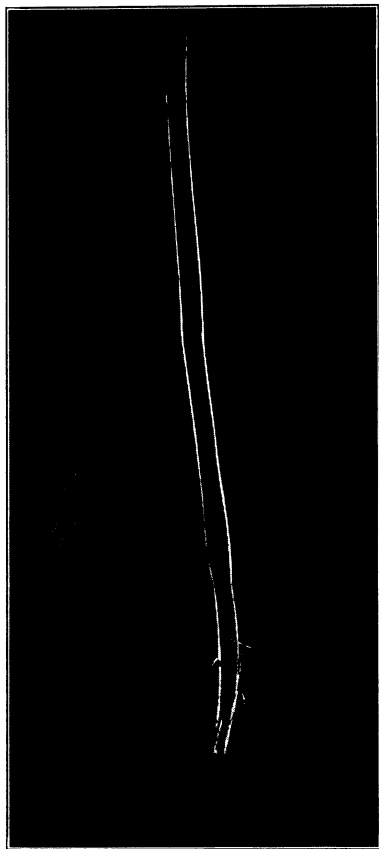


Plate XLIX. Tiker (*Scirpus lacustris*).

ish swamps and along tidal streams. It is also found in tropical Africa, Asia, the islands of Polynesia, and Australia. It is usually in flower from July to December. It was formerly made into mats and hats and is even now utilized in rare instances in weaving them, but it is most important as a material for slippers, and possibly for matting.

Of the 125 species of *Fimbristylis* found only in warm regions, two are of economic importance in the Philippines, while one

more might perhaps be tried out as a mat material. All the species of *Fimbristylis* have tufted, fibrous or woody stems. The leaves occur near the base. The inflorescence consists of a great number of flowers grouped closely together to form one or more spikelets. The spikelets themselves may be either solitary or clustered. The individual flowers are covered by glumes and are arranged spirally on the axis. As the fruit matures, the glumes of the flowers become the "chaff" of the grain.

TIKUG.

This sedge (*Fimbristylis utilis*) grows usually more than a meter long and has tufted stems which are shiny and smooth in appearance and average about 4 mm. in diameter. The stems may have long leaves at the base or may be entirely leafless, and are usually four- to five-sided immediately under the inflorescence. The general appearance of the stalk is round. The plant has few or no underground root-like stems. The flowers are densely clustered together to form spikelets, dusky brown in color, measuring 6 mm. by 3 mm. In the Visayas it is generally known as tikug. In Agusan and Surigao it is called "anahiwan" and in Bukidnon "s u d s u d". Sometimes it is called tayoc-tayoc in confusion with the smaller sedge more properly known by that name, which much resembles tikug. A specimen from Pampanga was labeled "muta".

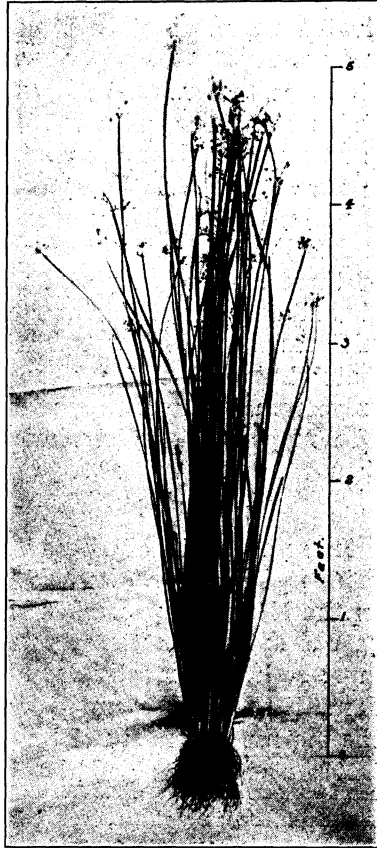


Plate L. Tikug.

Tikug grows in greatest profusion and reaches its highest economic importance in parts of Mindanao, Bohol, Leyte, and Samar. To a less degree, it is found and utilized on Negros and Panay. While it is found in Cebu, it is not used there. As a recognized industrial plant, therefore, its distribution is confined to the Visayas and Mindanao. Its appearance in Pampanga would indicate that it may be found in other regions in

which its value in hand-weaving and in the making of matting is not understood.²⁶

Tikug is utilized in making hats, mats, matting, slippers and various minor articles.

SAMAR MATS.

GATHERING THE STRAW.

The best known tikug mats are produced on the Island of Samar, where the sedge grows wild.²⁷ It has never been cultivated there. Different grades are recognized in the height and width of the straw. The finest is $1\frac{1}{2}$ mm. in diameter while the largest straws are fully four times that width. Full grown stalks sometimes reach 3 meters in height, but the average is $1\frac{1}{2}$ meters. In most places in Samar only very coarse tikug is found and this is especially true in the northern half of the island. The best material grows near the towns of Basey and Sulat, a circumstance probably due to the fact that most of these sedges are pulled up for weaving before they become old and coarse, for it is in these two towns that the mat industry of Samar is centered. All grades of tikug can be used in making mats; but as the straw cannot be split into finer pieces, it is only from the narrower material that the fine mats are made. The map on the distribution of tikug shows the regions in Samar in which this sedge occurs.²⁸

BLEACHING.

In some parts of Samar rough mats are made from tikug dried in the shade. In Basey and Sulat bleached straw is used. In the bleaching process only the sun is used, the bundles being spread out where there is neither grass nor shade. The straw must be kept perfectly dry at all times, for if it becomes wet or damp it will mildew and turn an unsightly black or brown. In the morning it must not be put out until the ground is dry and in the evening it should be taken in before dew is formed upon

²⁶ Robinson, in Vol. VI, No. 2, Section C of the Journal of Science, states that this sedge also grows on the eastern side of Luzon.

²⁷ *F. meliacea* is also known as tikug in Samar but it cannot be used in weaving.

²⁸ In pulling up tikug the whole stalk can generally be obtained by grasping it a short distance below the top. It is made into small bundles and tied a short distance below the seed heads. Each bundle contains from forty to sixty straws. In all towns except Basey the weavers gather the stalks they use. At Basey, however, where weaving of mats is a recognized industry, the straw is obtained from country people who make it a business to gather and sell it. These tikug vendors carry the bundles of green straw to the town where they sell for from forty centavos to one peso per hundred bundles, depending upon the length of the straws.

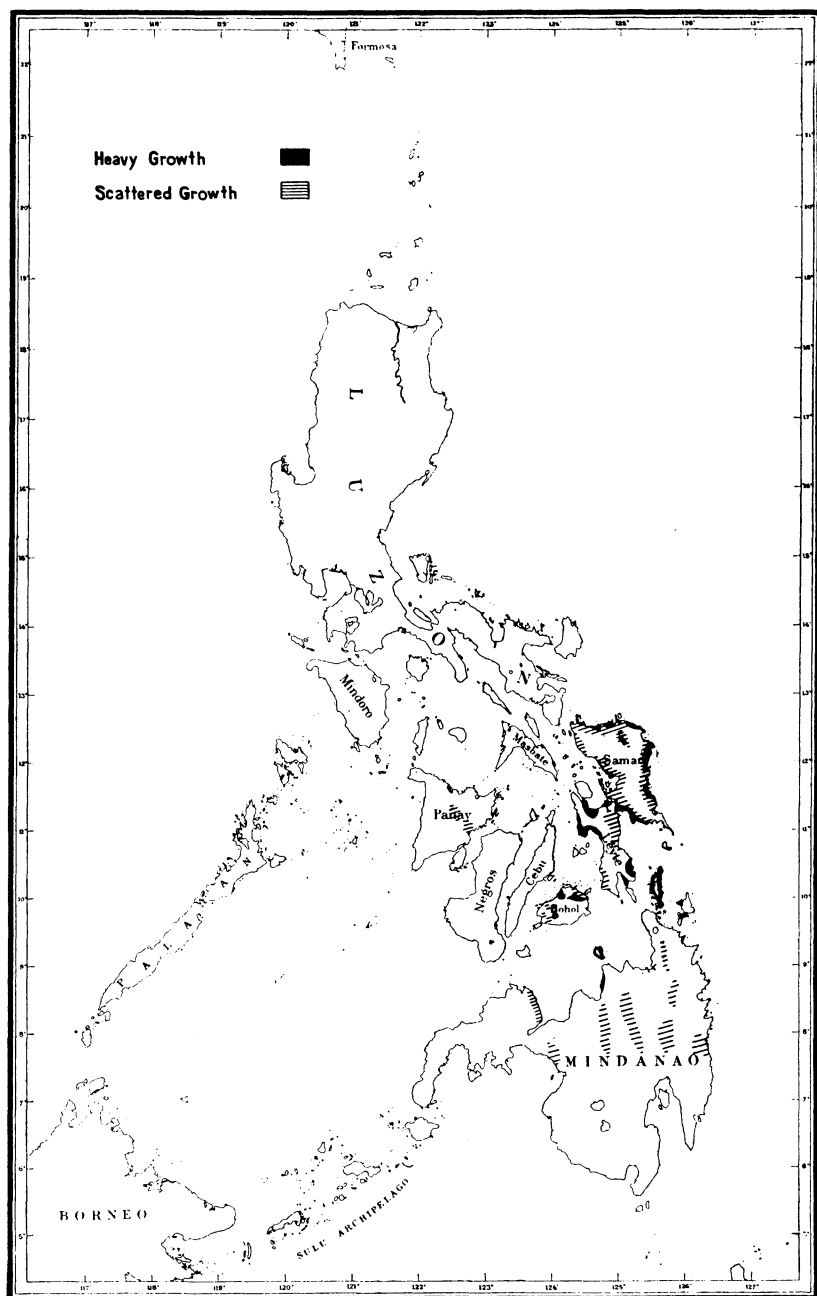


Plate LI. Philippine distribution of *tikug*.

it. The best results are obtained by drying the material in a place where there is no grass, as the turf generally holds considerable moisture and retards the process. With proper care clean white straw can be obtained in about one week under the most favorable conditions. Sometimes, but not often, the above process is preceded by boiling the straw for ten or twenty minutes in plain water. Several bleaching experiments have already been made with tikug, but as yet none have been entirely successful. In one experiment straw was boiled in alum, but the resultant material was not so white as that obtained by

simply drying it in the sun. Boiling green tikug in water containing acetic acid from the juice of limes and lemons was unsatisfactory. The best straw obtained was that produced by simply boiling the green stalk for a few minutes in water and rinsing it well and then drying in the sunshine for several days.



Plate LII. Dyeing tikug, Bases, Samar.

The straws are of different lengths and diameters; after bleaching they must be sorted. The seed clusters are removed and the bunches are tied in a big bundle which is laid on the floor with root toward the worker. The longer straws of small

diameter are then pulled out and placed in small bundles, the process continuing until the several different grades are thus separated and nothing remains but a few short thick straws which are kept for embroidering designs. Each bundle is then trimmed by cutting off the roots and ragged tops and the straw is ready for storing, dyeing or flattening. If tikug remains in a damp place it will mold and become worthless. It is easily kept during the dry season, if frequently exposed to the sun. During the rainy season it should be wrapped in a blanket or cloth.

DYEING.

Very few uncolored straws are used in Samar mats. The dyed material is more durable and does not mildew as readily as the uncolored straws. Tikug dyes easily and this is probably one of the reasons why the mats of Samar have so much color. The cost of the dye in a Basey mat is no small part of the total expense of production. Consequently it is necessary to employ a cheap dye. For instance one of the best commercial dyes known in Manila was used with great success on Samar mats, but the value of the coloring material consumed in making them was greater than their selling price. The dye used in making the cheapest of Samar mats costs the weavers about 10 centavos while the more elaborate products need as much as 65 centavos worth of dye to color them. A common mat containing 15 centavos worth of dyestuff sells for about a peso.²⁹

The colors obtained by the Basey mat weavers have a greater variety of shades and tints than those produced by any other workers in the Philippines on tikug or any other mat material. The shades and tints depend upon two considerations: (1) The amount of dyestuffs used and (2) the length of time the boiling process is continued. Four dyestuffs are used. Yellows are obtained from turmeric; greens and reds are obtained from coal-tar dyes; and a red-orange from deora. The leaves of the latter plant are crushed and the pulpy mass thus obtained is boiled to yield the dye fluid. By combining these four dye materials in different proportions, by using varying amounts of the material, and by boiling varying lengths of time, different colors, shades and tints are obtained.

The method of dyeing is as follows: The bunches of tikug are coiled and placed in a can of hot dye where they are boiled from two to ten minutes, or until the desired intensity has been secured. The more the straw is boiled, the more nearly permanent will be the color and the greater will be its intensity. Care must be taken to see that the dye fluid is not too strong; otherwise the color will be too intense. In order that the material may be evenly colored, the tikug is submerged in the dye so that it is well covered and is turned over several times during the process. After the coils are removed they should be laid upon the ground or floor, allowed to cool, and then hung in the shade to dry.

²⁹ The high cost of these dyes results from the adulteration practiced and the exorbitant profits usually about 450 per cent. It is expected that the new dyes obtained from Germany through the Bureau of Education will make a saving of about 80 per cent to the workers.

FLATTENING.

The straws composing the bleached or dyed bundles of material are stiff and uneven; some are bent and others are round. The process of flattening them and making them more pliable is carried on during damp days, in the morning or evening, for if done in the open air on cloudless days, or at any time when the atmosphere is dry, the straw becomes brittle and breaks. However, climatic conditions may be overcome by wrapping the straw in banana leaves or damp cloth for an hour or more and then working it where no breeze can dry it out. No water should be applied. The workers employ the usual blunt-edged, ruler-like piece of wood; between this and the thumb the straw is drawn by the free hand. This process flattens the straw and makes it pliable so that it does not split during weaving.

THE WEAVING OF SAMAR MATS.

Up to three years ago tikug was but little used in Samar except for weaving mats. Commercially, mat weaving was confined to Sulat and Basey. Since the American occupation it has been widely used and the work has been introduced into most of the schools. Not only have methods been greatly improved but new uses have been found for the material. To-day the sedge is woven into floor and wall mats, hats, table mats, slippers, book-bags, hand-bags, necktie cases, pencil holders, pencil cases, and pillow and cushion covers. Recently the weaving of matting on looms has been undertaken in the schools and a fine product, similar to the matting of Japan, has been produced on the ordinary loom adjusted to the straw.

The chief use of tikug in Samar is in the weaving of mats in the towns of Basey and Sulat. Since time immemorial tikug mats have been woven on Samar. At Palapag, Oras, Dolores, Taft, Balangiga, Santa Rita, Gandara, Oquendo, and Catarman, a few rough ones, the product of unskilled workmen, were made, but they were of no commercial importance, since the people did not weave enough to supply their own demand. As far back as can now be traced, the people of Basey and Sulat have been making mats for the provincial and interprovincial trade. Since 1907 the people of Dolores, Oras, Santa Rita, and Balangiga have improved in weaving and are now producing a few mats for the market. Their work is much inferior to that of Basey and Sulat. In the year 1911 Basey produced about 9,000 mats and Sulat about 300. The latter town could have increased its production greatly, but its remoteness from the market and from the routes of commerce reduces the large demand which

might otherwise exist for the mats. Basey is better situated in these respects; moreover, the people have been forced to fall back on mat weaving as their chief means of support, for typhoons have destroyed their coconuts and abaca, and their rice crop is scant. Almost every night mat weavers are found at work in many of the houses.

Several years ago when American soldiers were stationed in the vicinity of the town, there grew up a great demand for mats, and the weavers, taking advantage of their need and their little knowledge of values in the Philippines, demanded exorbitant prices and received them. Most of the Basey people spent their time producing mats, and to a great extent sacrificed quality for quantity. The grade of mat that sold for ₱18 several years ago

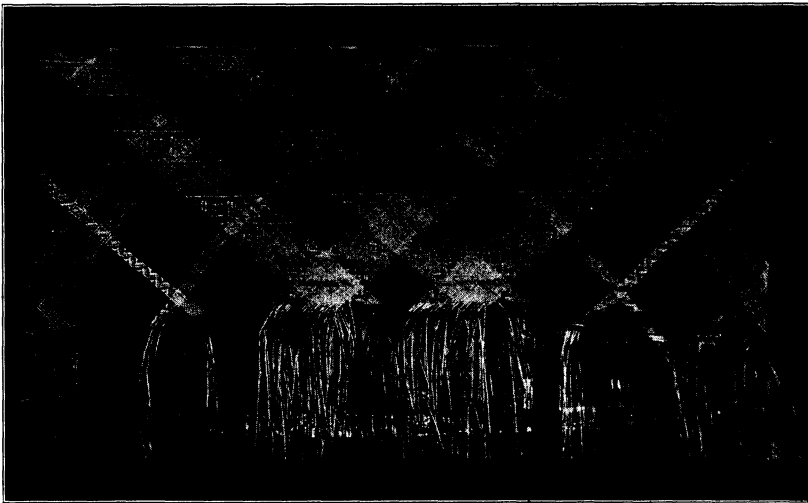


Plate LIII. Incomplete Samar mat of medium grade showing woven-in design.

can now be bought for about ₱8; that which sold for ₱3, two years ago can be bought to-day for ₱2. Lately there has been a rise in price owing to increased commercial demand. Mats made to order, particularly special mats, cost more than those bought already woven, the price depending upon the size of the article, the character of the design, and the fineness of the straw and the weave. A mat two meters by one meter, made of the finest grade of tikug, would require several months for completion and would probably cost between ₱30 and ₱40. There is hardly a limit to the size of the mat which can be woven. Three years ago one having dimensions of 10 meters by 12 meters was made for a church, as many as 30 women working on it at the same time.

Basey mats are of two general kinds; those with plaid designs woven in and those on which the designs are embroidered. The former are the more difficult to weave; but as there is no decoration to be added, they are the cheapest mats obtainable, the prices for the ordinary grades ranging from ₱0.80 to ₱3 each. Some weavers turn out only blank mats of one color and do neither designing nor decorating. Straw used on these is usually dyed, very few mats of natural colors being made. They are worth from ₱0.50 to ₱2 each and are generally sold to girls who are skillful in embroidering designs. These girls decorate the mats and sell them for from ₱2.50 to ₱6 each, the price depending upon the original cost of the mat and the amount of decoration put upon it. The ideas for the designs on Basey mats are usually



Plate LIV. A cheap Samar mat with woven-in design.

obtained from pictures or textiles. The straws, both bleached and dyed, are split in two for embroidering purposes. This makes them thinner and more pliable.

The time necessary for making a plaid mat sold for two pesos was found to be as follows, an eight-hour day being used as the basis of a day's work:

	Days.
Gathering tikug	1.00
Dyeing tikug .....	.25
Flattening tikug .....	.25
Weaving mat	3.50
Total time	5.00

The selling price of the mat was one peso, the cost of the dye 15 centavos, which left the weaver a balance of 85 centavos for

five days' labor. The plaids used in Basey mats are simple, but the embroidered designs are extremely intricate. They consist for the most part of foliage, flowers and animals. Weavers are often given a contract to make a stated number of mats in accordance with a design furnished them. A few are capable of reproducing almost any pattern presented,³⁰ but if they are not told exactly what colors to use they employ every shade, color and tint they can secure. The Basey mats are distinguished by the multitude of colors used. In general it may be stated that the chief criticism of this product is the gaudy effect produced by the colors used. In some cases the colors are well toned and harmoniously combined, but the majority of the mats produced contain vivid colors which are not all harmonious. Through the

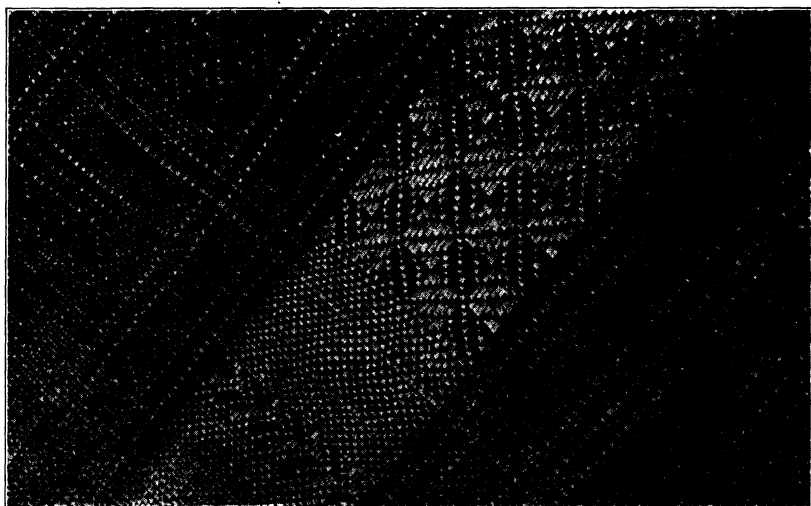


Plate LV. Detail of a woven-in design.

schools, efforts have been made to reduce the number of colors and to modify the gaudy and complicated floral designs. An improvement is seen each year.

The ordinary mat is usually about 2 meters by 1½ meters, though smaller and larger ones are made. During the past three

³⁰ The following story is reported as showing the cleverness of the weavers of Basey in embroidering designs on mats. An engineer in charge of road construction refused to buy certain mats from a vendor but stated, jokingly, and in order to be rid of the insistent merchant, that if he were brought mats having designs which were of interest to him, as showing scenes connected with his work, he would buy them. In a few weeks the broker returned bringing with him a large mat on which were displayed a road roller, wheel barrows, shovels, spades and other implements connected with road building, and part of a road itself.

years the weavers have been encouraged to make mats about the size of an ordinary cot and to use no more than two colors in weaving them. A few mats suitable for placing under dining tables are also made.

Sulat weavers produce fewer mats than those of Basey but make them of fine, closely woven straw. Most of the mats with a woven-on border come from Sulat. These people, while able to produce a fine, soft, pliable mat, can not embroider decorations on them nearly so well as do the people of Basey.

Samar mats wear well. Wall mats last indefinitely and sleeping mats are used from two to ten years or more.³¹

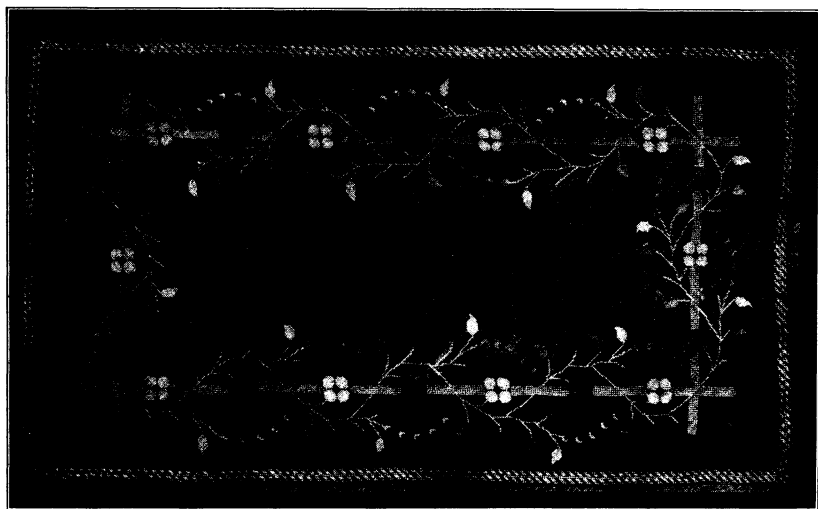


Plate LVI. An embroidered mat with simple decorations in comparison with most mats from Basey.

THE MARKETING OF BASEY MATS.

The port of Tacloban, Leyte, due to its proximity to Basey, is the chief center for the distribution of Samar mats. As soon as the mats are completed the weavers take them across the straits to Tacloban where they are sold to Chinese brokers, transients and residents, both American and native. Few ships leave

³¹ In general it may be stated that the sabutan and tikug mats are the strongest made in the Philippines. Neither the wearing qualities of the straw nor the permanency of the dyes in buri mats are equal to those of tikug. If tikug floor mats become dirty they may be cleaned without injury if the dyeing was well done. They should be shaken to remove dust and dirt, laid flat on the floor and lightly scrubbed with a cloth, sponge or brush, using lukewarm soapsuds, after which cold water should be thrown on them. They are dried by hanging in the sunshine or the breeze.

Tacloban that do not carry away from 5 to 20 mats; often they take away as many as 50, the amount generally depending upon the number of passengers aboard the boat. Some of the ship's employees are regular customers of the weavers and buy mats at stated prices to sell them again at a reasonable profit at Manila and other ports of call. Besides, there is quite a sale of mats in the towns of Samar, Leyte, and Cebu through vendors, residents of Basey, who secure the mats in their home town at low prices and sell them at a profit. These persons usually deal only in the mats, and sell them for cash, not trading for other articles. Plaid Basey mats are on sale in nearly all the Chinese general merchandise stores of Manila.

As yet there is little supervision by brokers in Basey. The mat industry there needs but the introduction of some system of supervision by brokers to regulate the size, quality, design and color scheme of the mats, and a foreign market to become a much more extended industry. The schools have already done much toward improving workmanship and design; it must remain for individual enterprise, however, to get in touch with foreign demand and supervise the weaving of mats to suit it.³²

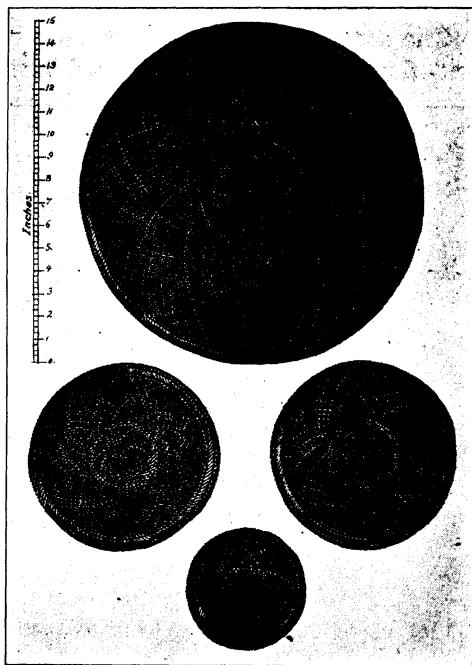


Plate LVII. Small table mats.

BOHOL MATS.³³

Tikug mats are made in large numbers in Bohol. The straw for the most part is finer than that used in Samar and the pat-

³² A firm has recently entered the field and is doing a mail order business in these mats with the United States. Their plans include the furnishing of straw and dyes to the weavers and the weaving of standard designs.

³³ Most of the information given under this heading was taken from reports by Percy M. Jones and Frank Thomason, formerly supervising teachers of Bohol.

terns are chiefly stripes and checks. Very little embroidering is attempted.

Bohol mats are used principally for sleeping purposes. In northern Bohol there is scarcely a family that has not three or more large mats, which are rolled up and laid away during the day time and are unrolled upon the floor at night for a bed. They are durable and last for years. Large sleeping mats may be purchased in quantities as high as 40 to 100 during the Sunday market day in Talibon or on the Saturday market day in Ypil, a barrio of the same town. In price they range from one to three pesos each.

The second use of Bohol mats is for decorating walls, tables, and floors. Those so employed are smaller than the sleeping



Plate LVIII. Embroidering a mat.

mats, usually square, but sometimes round. More care is exercised in their weaving and only fine young straws are used. The preparation of the straw and the dyeing are done with great care. Mats of the best quality are quite difficult to secure and the schools have recently been encouraging their production.

As in other regions, the tikug from which Bohol mats are made, grows wild in the rice fields after the harvest. It is found in abundance in northern Bohol in the municipalities of Getafe, Talibon and Ubay, and sparingly in other towns of the island (see map). The straws are gathered from the field by pulling them, thus breaking them off at the roots, and they are tied into bundles about 3 decimeters in circumference and sold in the market. The largest market for such bundles is found in

the barrio of Ypil in the municipality of Talibon. The price is usually about 10 centavos per bundle. From two to four of these bundles are required to make a mat.

The tikug is not kept in the original bundles longer than one or two days, for it will turn black. The material is usually separated into two parts, one to be dyed, the other to be bleached. That to be dyed is spread in the sun and thoroughly dried for one or two days, care being taken that rain does not fall upon it and blacken it. The other part is boiled in a solution of acetic acid for twenty minutes, after which it is thoroughly dried in the sun and thus bleached.

The natural dyes used in Bohol for coloring tikug are dauda and turmeric. The former produces permanent colors, the latter fugitive ones. The artificial dyes bought at Chinese stores are also used in producing shades and tints of green, violet and ruby which are satisfactory. In general those in crystal form have proven more satisfactory than the powder dyes. Before dyeing, the sheath-like leaf is pulled from the bottom of each straw and the material is looped into small bundles. Often the straws are dampened with water. Dyeing is usually done in a 5-gallon petroleum can two-thirds full of water, heated to boiling. If the artificial dyes are used the powder is stirred in and dissolved and the bundles of tikug are then pressed down into the liquid so that all the material is well covered. A stone is often laid upon the straws so as to keep them down in the boiling dye. It usually requires about twenty minutes to obtain the desired shade, which is nearly always a deep one. Where fresh dauda leaves are employed, about 2 pounds are placed in the water and boiled a few minutes before the tikug is put in. If dried leaves are used about one pound is soaked in cold water for a few minutes and the whole mass is then added to the boiling water. Turmeric roots are pounded in a mortar and then added to the boiling water, after which the tikug is added. All the dyes noted are combined to produce other colors and varying shades.

During the process of dyeing, the straw should be turned and moved about in the boiling water to insure an even color. The straw should never be boiled too long, or it will be cooked and become tender and weak. After the straw has taken on the shade desired, it is removed from the can and thrown on the ground. When the bundles are cool enough to be handled, they are untied and the straws spread out to dry, preferably in the shade. After it is thoroughly dried the material is rebundled and thus kept for weaving.

Before weaving, the straws are flattened by drawing each one separately between the edge of the knife and the heel of the weaver's foot of the sole of the chinela. Damp days are best for this process. Weaving is done under the house or under trees. Evenings and nights are most suitable for this work on account of the dampness of the atmosphere. The embroidered mats of Bohol are decorated with split straws.

The mats of Bohol are bought by traders who exchange cloth and other goods for them. These men carry them to the towns of Bohol which do not produce mats, and to other islands where they sell or exchange them at a good profit. When once the supply of mats on hand has been bought up in a mat producing town, several months elapse before the market there is replenished by a new supply. After completing a mat, the weaver has no immediate desire to begin another. It is quite probable that the output of mats could be increased considerably if the market and the price were better. It is estimated that the weavers earn not more than 20 centavos per day at the industry.

OTHER TIKUG MATS.

Tikug also grows in large quantities in Leyte. Its chief use there is in the weaving of matting on a crude loom, an adaptation of the common textile loom.

Tikug is apparently generally used throughout Surigao in making mats. The best mats of this region come from the upper Agusan and the island of Dinagat. They are usually made for local consumption though the people of Dinagat exchange their mats with Bohol traders. The sedge grows in great abundance in the lake of Talacogon near the town of the same name in Agusan.

Tikug is also found in many parts of the Moro Province. It abounds in the swamp lands of the Lanao region, from which mats are exported via Iligan. If it is to be colored, the straws are soaked in water for about two days, after which they are cooked in the boiling dye. Bleached straw is prepared by exposing it to the sun, after which the material is polished and flattened at the same time by rubbing the stalks with ashes, between the fingers.

THE CULTIVATION OF TIKUG.

The question of the cultivation of tikug is one of considerable importance. It is a well known fact that the finest Leghorn hat straw is produced in Italy by sewing wheat closely and reaping the straw before the grain ripens. The best mat straws of China and Japan are produced from cultivated sedges. The

Bureau of Education is therefore encouraging experiments in the cultivation of tikug, but as yet these have not been extensive enough to determine whether the sedge can be propagated for industrial purposes. There are no data as to cost. A quantity of seed was procured and forwarded to various parts of the Islands in which tikug had not been reported as growing. These were sent out to various persons with the idea of determining (1) soils suitable to the plant, (2) whether it could be cultivated in the rice paddies between harvest and planting, (3) how closely the seeds should be planted, (4) how old the plants should be at harvest.³⁴ No results have as yet been obtained from the seeds so sent out. Fair results, however, have been realized in Samar, where approximately 5,000 stalks were grown to the square foot in very rich soil fertilized with manure secured from the military stables. The straws obtained were 3 meters long. It was found that the thicker the seeds are planted the finer and longer are the straws obtained.

Reports differ as to whether tikug should be considered a pest or not. In Leyte it is stated that it grows in the rice fields along with the rice crop and appreciably diminishes the crop. There it is a weed pest; in Samar it is not so considered. In Bohol one teacher states that the plant is not a pest as it will not grow in dry localities, and hence does not interfere with crops. Where it is found in the rice paddies, a covering of earth will easily destroy it. It does not scatter quickly, for, while the roots will grow if transplanted, the sedge is mostly propagated by seeds and these are distributed principally by water and not by wind. No great chances are taken in planting tikug. On the other hand, some teachers state that the seeds are scattered by the wind and that the roots impede the plowing of the fields.

It is probable that where the tikug obtains a good foothold on irrigated rice land it proves a considerable annoyance to farmers; but its growth as a pest can be regulated by plowing.

TAYOC-TAYOC.

This plant, *F. diphylla*, one of the most widely distributed of all sedges, is found at all altitudes up to 2,000 meters throughout the warm regions of the world. The stems may be smooth or hairy and the leaves one-third to two-thirds as long as the stem. *F. diphylla* is generally smaller than *F. utilis*. Its stem is only 2 mm. in diameter. The flowers, densely clustered into spikelets, are generally of two colors—straw and brown. They reach 1

³⁴ Circular No. 82, s. 1911, Bureau of Education.

cm. in length and 4 mm. in diameter. Below the spikelet the stem has from 3 to 5 sides. The roots are fibrous; underground stems may occur, but they are never more than 2.5 cm. long.

This plant is known as tayoc-tayoc in Iloilo, Capiz and Occidental Negros. It is reported from Pampanga and is called "tab-tabin" in Zambales.

The straw produced by tayoc-tayoc is much finer but considerably stiffer than that from tikug, and cannot be considered so good an industrial material. Nevertheless it is used to some extent in the production of hats and mats, especially in the provinces of Iloilo and Capiz. In Dumalag, Capiz Province, hats are of considerable importance. Mats of tayoc-tayoc are reported as made in Banate and Janiuay, Iloilo Province, but this has not yet been verified.

As with tikug, seeds of tayoc-tayoc were obtained and distributed among various provinces to determine whether the propagation of the straw was practicable and if the cultivation of the plant would result in a better material. As yet no definite results have been obtained.

A RUSH STRAW.

But one rush straw has been brought to the attention of the Bureau of Education; it is the Japanese matting rush, *Juncus effusus*. This species is distributed over a large part of the globe, being the candle rush of Europe and the common plant of wet ground in the United States. In Japan it is made into beautiful mattings, the handsomest and most costly produced. The pith is also employed for lamp wicks, and probably the "timsim" imported from China and used in oil lamps in the Philippines is obtained from this plant. *Juncus effusus* has no native name in the Philippines. It is found throughout the Mountain Province and in the Apo region of Mindanao. It attains a height of almost 2 meters where soil and moisture conditions are favorable. The stalk is cylindrical and at the end tapers to a point. It is from 2 to 3 mm. in diameter. The flowers grow in a bunch on the side of the stalk near the top and are light brown in color. At the present time this rush is not utilized in the Philippines, though it is probable that it can be used in the weaving of many articles. If split, a flat straw is obtained by removing the pith.

Nothing intensifies interest so much as to endeavor to do a thing yourself; nothing arouses attention and clear observation like handwork in all the arts and crafts.—FRANCIS W. PARKER.

THE INFLUENCE OF THE TRADE SCHOOL ON THE PEOPLE.

C. M. ALCAZAR, Principal of the Trade School at Dumaguete, Oriental Negros.

ANY ONE who has observed the life of the masses in the Philippines will readily agree with me when I say that the majority of them can seldom afford to have nutritious food, sanitary homes, and proper clothing. On account of their poverty, very few can send their children to school long enough to complete the primary course. As a result their children, if they finish the fourth grade at all, are only fit to fill positions which seldom yield a salary of over ten pesos per month.

The establishment of the trade schools, therefore, is a godsend to the poor people. If a parent can keep his child in school through the primary course, he will find a gradual decrease in the expenses for his schooling in the fifth grade and later will be relieved from worry about further payment for clothing and other immediate necessities of the child, while attending school.

Parents of limited means are encouraged to make efforts to send children through the primary course on the assurance that there will be a trade school where they can continue at small expense at first, and at little or no expense for the last year and a half of trade school work, and where they will be able to finish a course beneficial to themselves and their families.

Before the trade schools were organized, furniture making was entirely in the hands of a few natives, some Chinese, and other foreigners. Consequently, the prices were so high that only well-to-do people could afford to have furnished homes. But after the organization of the trade schools, the prices in the shops owned by these men were gradually lowered to compete with the trade school prices which are meant to cover only the cost of material and labor, with a small profit.

As a result, people of small means can now manage to have more furniture in the homes, especially in those homes where trade school boys are living. These houses become decorated first with picture frames of various sizes and styles, as indicative of the pupil's progress in the school. Next, wall-brackets begin to appear; then tables or book-shelves; and finally, pieces of more difficult construction, such as wardrobes and writing desks. The homes are made more attractive and social intercourse is thereby promoted.

This social intercourse brings about an endeavor on the part of each boy in the neighborhood to be more efficient and productive in his school work. As a result, every article produced by the boy, together with his record of progress in the school, is an advertisement for himself and his family. Every family or home thus advertised becomes a part of a union of families. That is to say, a trade school is a help towards widening the social sphere of a family which would otherwise be unknown. It also tends to unite the people of the community by the eventual formation of a bond of sympathy. This bond is strengthened by the fact that the poor and the rich work together at the same bench, machine, or drawing table, are subject to the same treatment from instructors, and are allowed the same rights and privileges.

Moreover, with the present standardization of the trade school work throughout the Islands, rough Chinese finishing and antiquated designs are fast becoming out of date. We notice that furniture and houses that have been built by trade school boys are of more simple decoration, but have more woodwork and are of better construction and finish. It is also noticeable that this line of industrial work in the Philippines is beginning to come under the control of the natives.

Much government work which was heretofore awarded to artisans in different localities is now given to the trade schools on account of the saving usually realized and the generally satisfactory results obtained.

Railroad station counters, cases, and shelvings, constabulary trunks, gymnastic apparatus, high school windows, balustrades, concrete bridges, culverts, office and house furniture, and school furniture of all kinds, are all concrete evidences of the good results derived from the establishment of trade schools.

The trade school work is now carried on upon a solid commercial basis with courses of instruction well systematized. Every business transaction connected with any project for construction within the school is conducted in a business-like way. This gives a pupil training in his trade and at the same time imparts to him business-like principles.

The aims of industrial work and especially trade work are three in number:

1. To train the hand as well as the mind.
2. To teach the dignity of labor.
3. To afford a means of livelihood to every deserving pupil.

At the Bureau of Education industrial exhibit at the First Philippine Exposition, excellent examples of the harmonious training of the hand and the mind were to be seen. Every article in the trade school exhibits was made to conform to the drawing in the hands of the pupil, which was in most cases made by the pupil himself from the oral instructions of the teacher.

It was only twelve years ago that nearly all of the Filipinos hated manual labor because it was thought to be degrading; those that worked did so because they had to, and always with the idea that work with the hands was only for the low-born, and with the desire that they might escape it and become "ilustrados" (refined persons). That the dignity of labor as an aim of industrial training is being taught in the trade schools may be proved by the many examples we see of young men of excellent family who are found daily with the marks of toil on their hands.

I have in mind a certain prominent family in the provinces. One member of the family is now teaching in a provincial high school, while another member was graduated from the same school this year. The family blood being more or less Spanish, it is a matter of interest to note the career of the son who must now be nineteen years of age and is in the employ of a District Engineer. This young man, tired of much book work, entered a school shop where he did excellent work. In his second year, he was persuaded by a provincial official to accept a position with the provincial government. He had fallen so much in love with manual work, however, that whenever he had a leisure day he was sure to spend it repairing house or furniture, or constructing new pieces for the home. At the present time he has one of the best "home shops" that ever belonged to a trade school boy. His tools he has acquired from time to time in mail order lots from the United States.

Another instance: In Iloilo there is a young man who belongs to a well-to-do family. The trade school has made him a lover of manual labor, so that to-day his name is synonymous with the phrase "spirit of industry," or "work of quality." Indeed there are many other instances among rich and poor which might be mentioned where the training received in school shops has directed boys along lines of profitable industry. We count now many machinists, automobile engineers, and other skilled artisans along with the blacksmiths, cabinet makers, wheelwrights, and carpenters, who are the product of the shops maintained in the public schools. Invariably the records of these boys after leaving school have been good. They apply themselves with intelligence

and purpose to the trades which they have chosen and their advance is notable. They are a credit to their schools and to their country.

In conclusion, I wish to say that the trade school, together with improved means of communication such as good roads and bridges, has been the most effective means of winning the appreciation of the Filipinos to the good intentions of the American government in these Islands. It seems to me that industrial instruction through the various trade schools has contributed a great deal towards the pacification of our country. In other words, the trade schools help to elevate the ideals of the masses, to inculcate democratic tendencies in the minds of the aristocratic class, and to spread the industrial spirit among the Filipinos.

EDITOR'S NOTE.—Mr. C. M. Alcazar, who prepared this article originally, is a returned United States scholarship student. Since his return to the Philippines he has been employed in trade school work and is at present the principal of the provincial trade school at Dumaguete, Oriental Negros. This paper was prepared to be read before a conference of industrial teachers.

The United States Bureau of Education has recently published Bulletin No. 17, 1912, a thirty-page pamphlet on the Montessori System of Education. Dr. Montessori's booklet *Il metodo della pedagogica scientifica* aroused such keen interest in educational circles that it was immediately translated into English and German, and prominent educators from all over Europe and the United States have gone to Rome to study the workings of the system at first hand. The training of the senses through the muscles and the development of the child's body into something graceful and useful, presided over by a beautiful and orderly mind—this is a doctrine by no means unrelated to the general theme of the PHILIPPINE CRAFTSMAN. Perhaps the most remarkable feature of the Montessori system is its applicability to the case of children who are mentally abnormal. So striking have been the results with this class of children that we find Dr. Montessori making the statement that "mental deficiency presents chiefly a pedagogical, rather than mainly a medical, problem."—J. D. D.

"A considerable degree of hand-skill, in some directions, gives a child an ability to interpret the vast industrial world about him."

ABACA.¹

CHARLES H. STORMS, General Office, Bureau of Education.

THE CORD INDUSTRY.

In connection with the development of industrial work in the public schools there has arisen a demand for twisted abaca cord which promises to open up a new field of profitable labor to the women and children of towns and barrios in the abaca producing

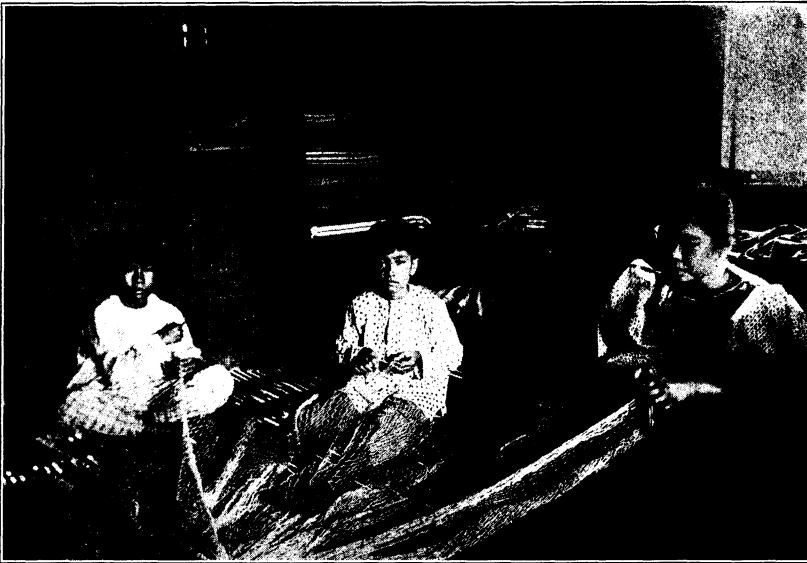


Plate I. Weaving a fishnet, Cavite.

regions. At present this new occupation is centered in the fishing villages of Cavite Province. It is interesting to note that the topography of the country has had much to do with the development of this industry. Cavite Province has a rim of low hills rising rather abruptly from the shore of the China sea. On the Manila side of these hills there is a gradual slope toward the bay shore, intersected by numerous rivers and esteros on the lower end and well suited for fishing operations. The plain at its up-

¹ This is the second paper on the subject of Abaca, which was begun in the August Craftsman. The series will continue through Volume I.

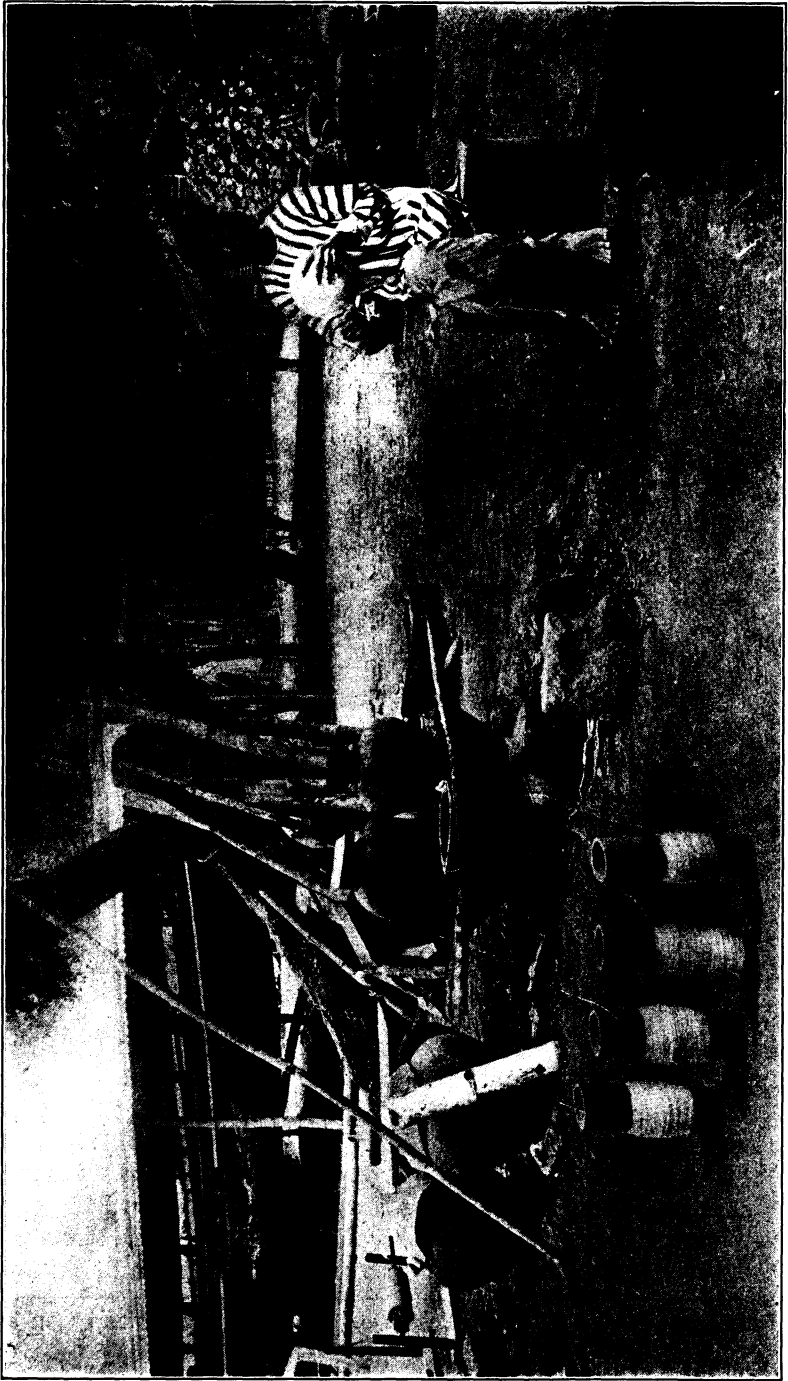


Plate II. Winding four threads into a ball.

per altitude produces some of the finest abaca fibers in the islands. This is worked up by the people of the highlands and lowlands. They make abaca cloth sufficient to supply local demands and a large export. They also send away large quantities of knotted abaca. In addition to these, the lowlanders make fish lines and fish nets. The twisted cord necessary for the nets is the basis of the new abaca cord used in industrial work.

The abaca fiber as it leaves the hands of the stripper is from 9 to 12 feet long and is ready for grading, baling and shipment to the world's market. To make the cord, it is first knotted and made up into labay or skeins.² In many barrios this is an occupation in itself and furnishes employment for thousands of women and children who secure a scanty income by a few hours of daily labor. This industry in the lowlands of Cavite apparently centers in Naic, which is not far from the abaca fiber market of Indang.

The manufacture of the abaca cord is a further use of the tied abaca. The laborers are the wife and those other members of the household who are too young or too old to engage in more trying labors of fishing or farming. The raw material is the knotted abaca which is usually purchased in the market or from friends. The work shop is the home and the surrounding yard. Working under the shelter of widespreading mango or rain trees, surrounded by discarded fishing boats and nets, kettles of mangrove dye, and frames for drying the large seines, while dogs, cats, chickens and goats leisurely wander in and out of view, these workers unconsciously furnish a picture of primitive industry whose realism is enhanced by the rude implements of the craft.

To produce cord for nets the fibers are tied four at a time. For industrial cord the single fibers are tied together. The skein of knotted abaca is placed on a revolving wooden framework or reel and wound by hand on a short joint of bamboo perhaps 3 inches in diameter. With cotton cord such as is used for coarse fish-lines, this may be accomplished by a foot pedal revolving a drum, supporting the bamboo. The foot pedal machine has not been satisfactorily adjusted to the abaca fiber, as its motion is jerky and breaks frequently occur which cause a loss of time and a multiplication of the number of knots. When four of these bamboo bobbins have been filled, the worker places them in a row on the ground and passes an end of the thread from each up over a wire or smooth stick which serves to create a light tension and to prevent entanglement of the threads. These four threads

² For a description of the abaca knotting industry, see Vol. I, No. 2.

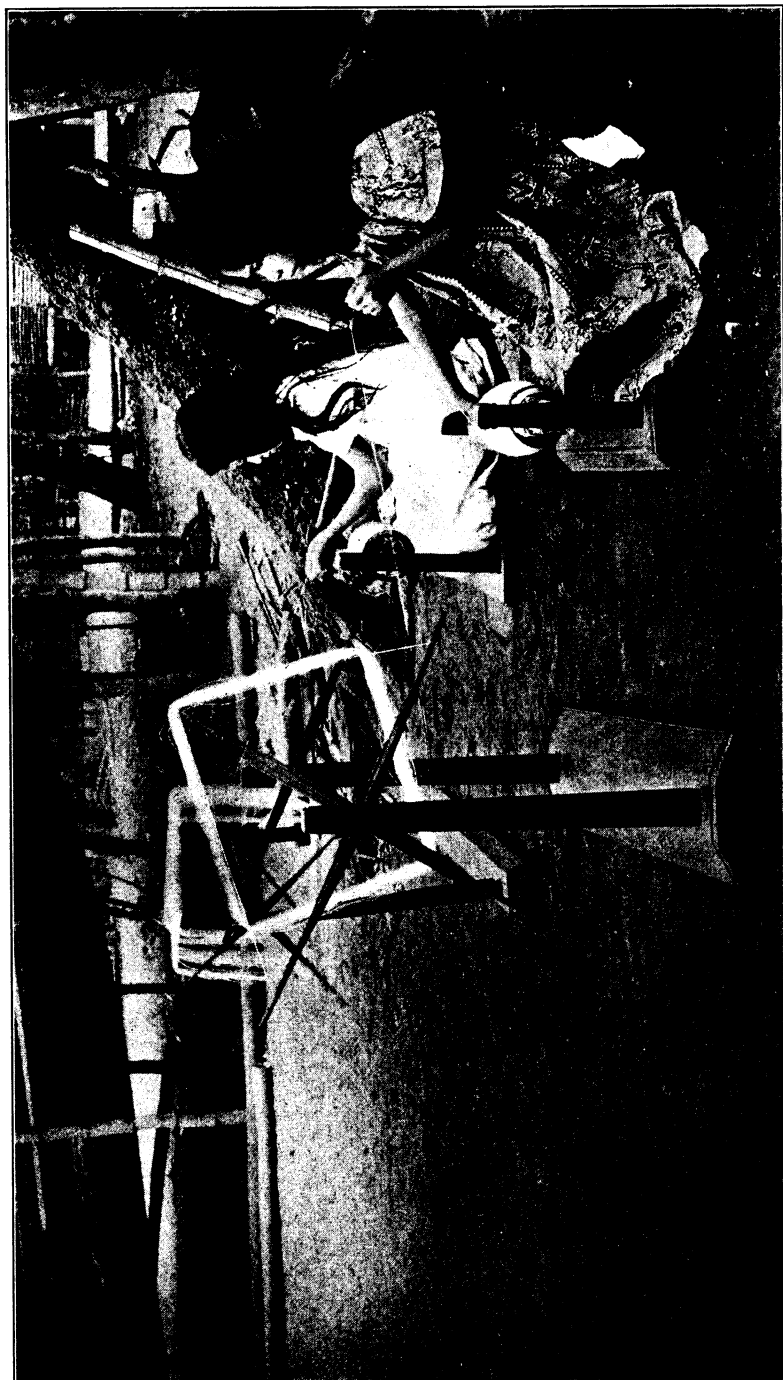


Plate III. Transferring the knotted fiber to bamboo bobbins.

are wound together as one string into a large ball. This constitutes the second stage in the process of cord manufacture.

The third and most important operation is the twisting of the cord. When used for industrial purposes it must be so manipulated as to make it hard, smooth and evenly twisted and so far as possible free from prominent knots. Two revolving spindles are used. The drive wheel which turns them may be especially manufactured for the purpose, but it is often a relic of a worn out bicycle with a short handle attached to two of the spokes. The whole machine bears a striking resemblance to the old American spinning wheel, but is smaller. The outer end of the four fibers is unwound from the ball and fastened to one spindle, and at the same time the other end is unwound from the inner part of the ball and fastened to the other spindle. A small boy draws out about 15 meters of string from the ball and stretches it taut. The operator, usually a woman, is seated on the ground. She furnishes the motive power and from time to time tests the revolving fibers with her fingers. When the four strands are each sufficiently twisted, the two small cords are fastened to one spindle and twisted together by a reverse motion, forming an eight strand cord of great strength. The completed cord called "a string" is transferred to two sticks thrust through the loops in the ends, and the operation is resumed until one hundred strings have been made. These constitute the market unit. They retail for about ₱1.20. It is stated that the strongest cord is made from wet material soaked by putting the ball of fiber in water for a minute.

As stated above, this operation differs from that by which cord is prepared for fishnets in one particular only, in that for the latter, the four fibers are tied at one time and are rolled into a ball directly from the skein, thus omitting the use of the bamboo bobbins. The knots in the net cord are necessarily more prominent in the completed work than in that used for industrial purposes, and since but little care is used in selecting the fibers the cord is uneven. Among the fishermen each family makes its own cord and nets, a labor in which men, women and children alike share. Although the nets are not made for sale and it is very difficult to purchase a good one, still a large number of people have a fair knowledge of cord manufacture, and they require but little encouragement to produce the cord in commercial quantities. Such work undoubtedly yields better returns as a supplementary labor than any other industry now open to them.

Twisting machines like those used in Cavite are fairly common in some sections of the Visayas but the cord is coarse and uneven.

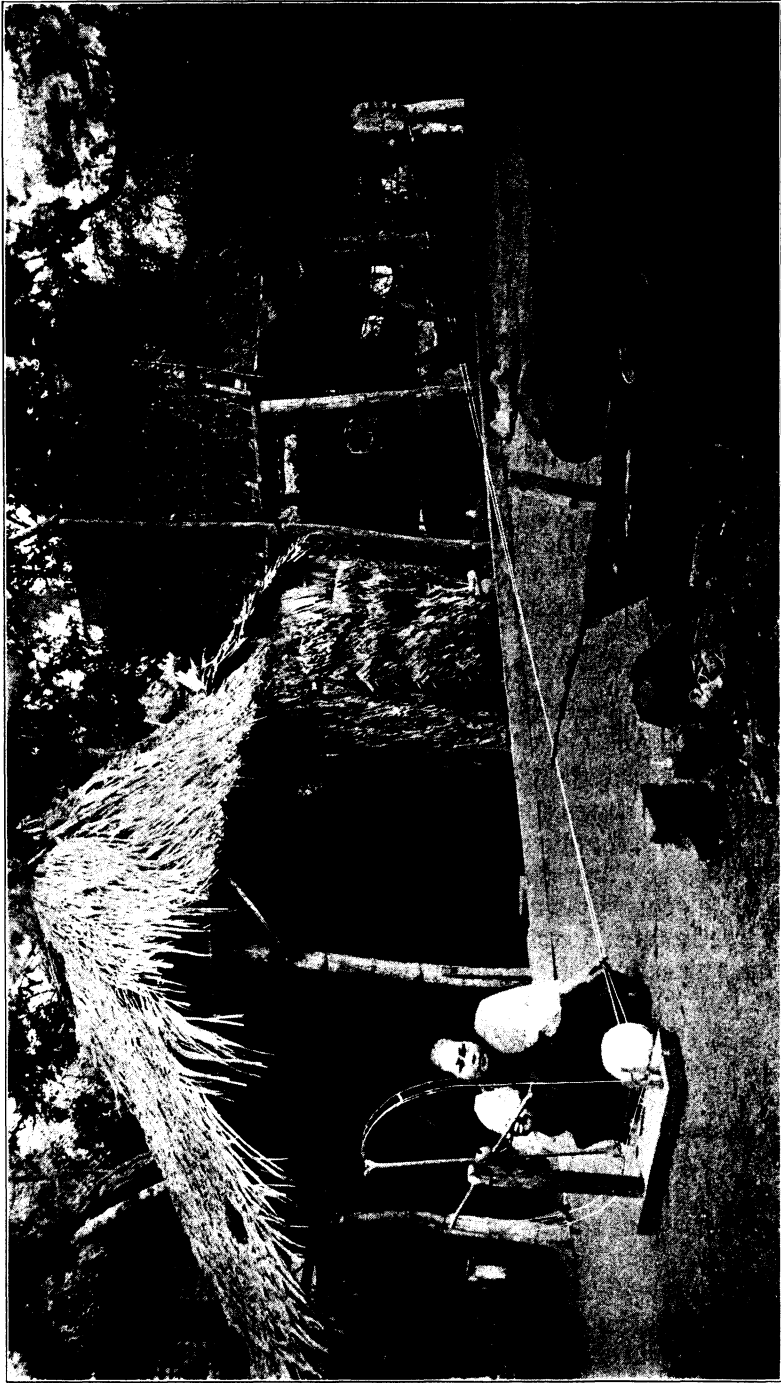


Plate IV. Twisting two strands at once; the third step in cord manufacture.

Abaca fiber has been used for some years in Capiz Province as material for slippers, and its value for this purpose is now well known throughout the Islands. At a later time the hand twisted cord was employed in the same manner in both Capiz and Sorogon. Capiz first used the cord as a material for macramé and



Plate V. A worker and the completed cord.

lace handbags. The manufacture of woven handbags is believed to have originated in Albay and Cebu. All these industries have now spread to many other provinces. In all these provinces the cord is often produced by the hands alone. This is slow and tiresome work and the strings are short.

As a material for coiled baskets this cord possesses the primary merits of beauty, durability and comparative ease of manipulation. Designs are easily developed, and when the fiber is properly handled it assumes a silk-like luster. The cord possesses an additional advantage in that its diameter may be readily adjusted to suit the taste of the maker and the size of the object to be made by special selection of fibers or by twisting together two, four, eight or even sixteen fibers as desired. The eight-fiber cord from Cavite is largely used for industrial purposes, probably through custom, since such a cord has been found by experience to be best suited to the manufacture of nets.

Coiled baskets first received public attention during the Carnival of 1911. They are now made in most of the schools of Cebu, Bohol, Albay and the Island of Negros and to some extent in other provinces. Instruction in coiled abaca basketry is given in the Philippine Normal School at Manila. Besides, the cord is the best of all local materials for macramé and lace bags, for the toes of abaca slippers and for woven handbags. Many other uses will undoubtedly be found for it later.

The necessary machinery for producing the cord can be easily made, and the knotted abaca is now obtainable commercially. Abaca cord therefore can be readily produced in all towns, even in the schools. For colored cord, the skeins of knotted abaca should be dyed before twisting, as a uniformly colored cord is thus produced; but fair color results may be obtained after it is twisted.

SPECIALTIES—INNOVATIONS.

In his report for the year ending June 30, 1912, President McFatrigh of the Chicago Board of Education says:

I fear that in our modern tendency toward specialties and innovations, we are neglecting the vital and elemental facts in the training of the children on which the success of their lives depends. A little more of the old-fashioned "common branches" injected into our modern school systems would be conducive to their practical value and helpful to the growth of mental virility in our children.

Sound argument; and let us hope that its weight among educators in general may be in proportion to the dignity of its source. For a wholesome life of practical usefulness, the boy who enters manhood equipped with a thorough grounding in the common branches and with a knowledge of how to turn his muscular energy to good account runs the minimum of chances of failure.—J. D. D.

IN THE BUKIDNON COUNTRY.

NORTH H. FOREMAN, Inspector of School Gardens and Sites.

OCCUPYING a high plain in the interior of Mindanao is a country which some day will be as well known in the Philippines as our western states are known in America. In that western country, for years the ranchman pastured his herds of cattle, giving way at last to the first nesters who came in such numbers that the land where the cowboy once rode at will became a sea of ripened grain. The central Mindanao plain, known as Bukidnon, waits for the whoop of the vaquero and the odor of singed flesh as the branding iron marks the ownership of the calf. But will the cattleman ever spur his pony to the top of an eminence and count his cattle grazing over these plains that stretch to the very mountain slopes? The nester is there already and the Bukidnon country may see its fields of grain and coffee before the advent of the cattleman.

The trip into the country is made overland from Cagayan, Misamis, a north Mindanao port three days from Manila. Conveyances are secured and a drive of an hour over a first class road which winds through coconut groves, brings us to the barrio of Agusan, where saddle ponies are procured. The road ascends gradually to the open country which extends inland as a plateau a few hundred feet above the sea. A stop is made for a last view of the bay and of that strip of coast country so picturesquely flecked with coconut trees, through which is seen the glimmer of the metal roofs marking the sites of towns. A short distance beyond, a board nailed to a post states in two words that we are crossing into the non-Christian subprovince of Bukidnon.

Perhaps in a previous visit to the Moro province we have met the Moro in his tight trousers, bright sash, and turban, or among the mountains of North Luzon we have beheld the Igorot in his full regalia of fringed gee-string, and we are curious to see these non-Christians of the Bukidnon. As we ride along we meet carabaos loaded with hemp and coffee. The women and girls with such traveling parties are shy, and with downcast eyes they maneuver to get behind the loaded animals. A little farther along the trail we pass a large mango tree, the green leaves of which present a refreshing contrast to the burnt land. Sheltered by two large rocks, this tree has survived the annual fires and

now furnishes a pleasant shade and resting place for tired packers. The road passes between two low mountains and approaches Tankulan, the first Bukidnon settlement. A herd of ponies is grazing upon the hillside near a tract of plowed land with the disk plow still in the furrow. An inquiry brings out the information that this is the property of one of the two Barton brothers who were the first nesters in that country. The

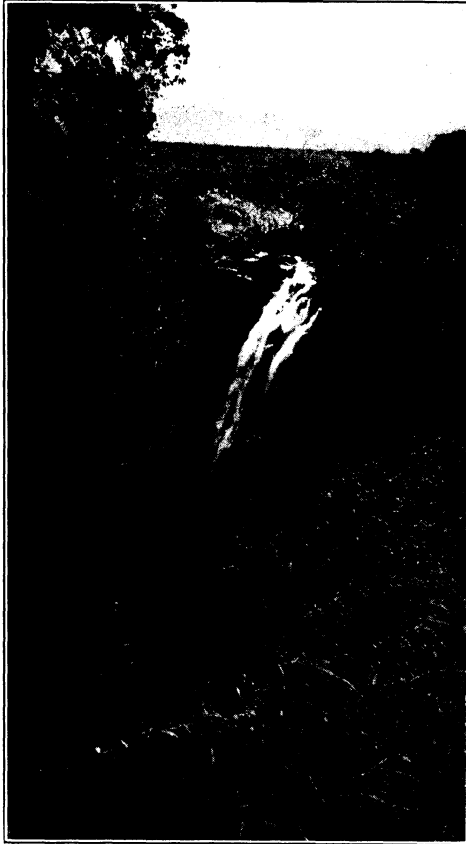


Photo by the author.

The Falls of Alalum.

remnant of what was the first Barton ranch, three days farther inland, is the home of the man who is still reluctant to leave the wide grassy plains which seem so full of promise. We were fortunate enough to meet this tall, strong, darkhaired man, who is still in the prime of manhood. He is a plainsman, a pioneer such as formerly rode the plains from Montana to Arizona.

Soon we reach Tankulan and eat our lunch. Resuming our journey we cross a cañon by an excellent pony trail which winds down and up in a zigzag and finally brings us to Maluco, where we are to spend the night. The cool air drops from the mountain and we crawl into our blankets. Early the next morning, though somewhat stiff

from the previous day in the saddle, we are off, urging our pack animals ahead of us.

The morning air feels crisp and refreshing. The picturesque trail either winds above small cañons or stretches into a grassy plain that widens out ahead. The noise of falling water is heard and a sudden turn brings us in full view of the falls of Alalum. Approaching, as we do, in the early morning, when the mists are

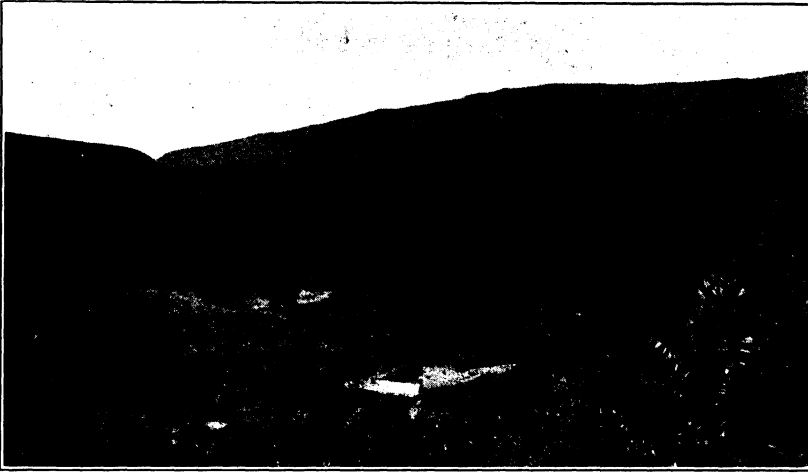
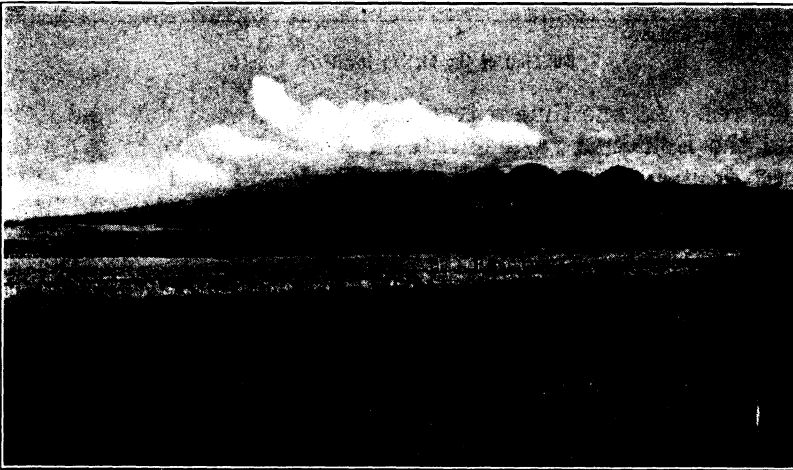


Photo by the author.

A cañon near the settlement of Impalutao.

beginning to clear away and the rays of the new sun are warming the black abyss into brown tints, we feel a thrill of pleasure and proclaim Alalum the most impressive waterfall in the Philippines. Reluctantly we ride on to Impalutao, the settlement on the Mindanao divide. The strong winds that blow steadily make the nights so disagreeably cold that this settlement is avoided by travelers. Beyond Impalutao the cañons are fewer.

In the onward journey, we pass settlement after settlement with their attractive plazas and clean streets. We spend the nights with teachers in their homes, or in the open town houses.



The school farm at the Mailag Industrial School.

Beyond the divide the pack trains going to the coast with hemp or coming back with the simple things which the Bukidnon needs become fewer. After passing Malaybalay, we ride into the Mailag country where is still seen what remains of that unfortunate project, the Barton ranch. Near this ranch is the Mailag Industrial School for the Bukidnon boys, and here we rest, in the heart of the vast plain that extends to the mountain slopes on both sides, reaching back to the north coast of Mindanao and on down the river into the Cotabato country.

The wide, grassy plain through which we have ridden for days is kept green by the annual burning of the cogon grass. Here and there, the country is dotted with a scattered growth of low scrub timber which has been able to resist the ravages of

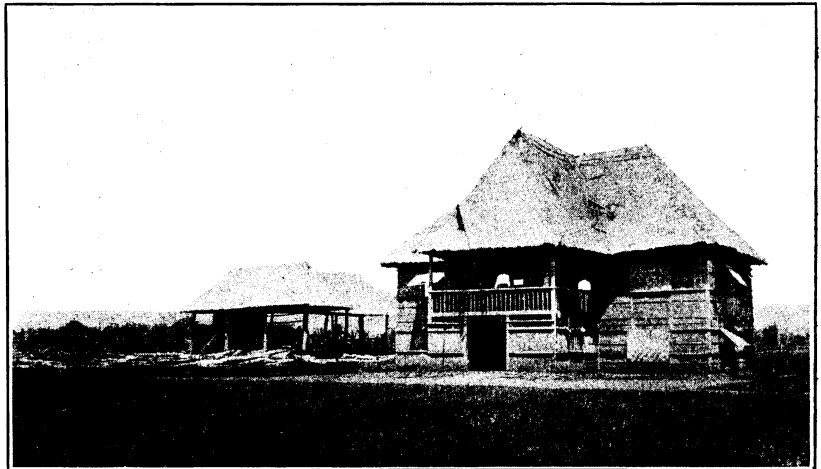


Photo by the author.

Building of the Mailag Industrial School.

the fires. At one time a tropical forest covered this vast area, and the Bukidnon farmer made his "caingin" by burning the trees from a small area. The newly cleared land was planted; but in two or three years the cogon grass crept in, and being unable to resist it the farmer made another clearing. Under this method the timber line has receded until the cleared land now creeps up the mountain slope, encroaching upon the fastnesses of the Manobo. Behind is left a wide grassy plain of untilled, fertile land, capable of supporting thousands of farmers. These wide acres of well watered grazing land are without animals and the long stretches of rich soil are producing no food for man. It is a country of prospects and possibilities. Some day it will be the range of herds of cattle and the home of many

prosperous farmers. Scattered over this grassy plain are a few thousand people.

The Bukidnons are quiet, peace loving, and content to live in their simple homes with few comforts and almost no household industries. The manner of life, while it fails to develop a keenness in barter, has left the present generation with a love for home and the family. The Bukidnon farmer is quiet and obedient to such an extent that he will endure abuse rather than resist authority. He may own a horse or carabao, but he knows as yet but little of its value for farming purposes. When the family needs become so urgent that a trip to the coast is a necessity, the animal is loaded with hemp or coffee and the trip is made. The proceeds are invested in cloth, salt and other simple commodities. Such a journey may take from eight to fourteen days. As we meet the Bukidnon on the trail, or in the settlements, he is always clothed. There is nothing in his general appearance to distinguish him from the people of the inland sections of other provinces. His life is simple and he is accustomed to live within his own family circle. The country is without stores or peddlers, or even small food tiendas. Money is seldom brought back from the coast; only to a very small extent is it a medium of exchange among the people. Although the Bukidnon has learned but little of the use of tools, he has a fair house and is fond of his home.

Over this vast plain, trails are being made and settlements started. In these centers the people are encouraged to build good houses and to live permanently. It is hoped to make each Bukidnon family a part of a community rather than lone individuals engaged in the hard conflict with cogon grass, the receding timber line, and the ravages of the Manobo warrior. The Bukidnon is to send his children to school. He is to learn simple industries, and the use of animals and tools in overcoming the cogon grass. He needs to know how to make the land give him a living. Settlements ranging in size from ten families to one hundred and fifty families were established in the old days by Spanish friars, and more recently by the present Government. The completion of first class trails connecting them and making the coast trip easier has caused all centers to prosper. The Bukidnon settlements, which are models for arrangement and cleanliness, begin with a small well kept plaza from which the streets extend. The houses are well built and set in neatly kept yards planted with bananas and coffee. Near the villages, the trails are bordered by small fields which have recently been taken up and planted. Nearly all of these villages have small

chapels and municipal buildings facing the plazas, and school buildings located nearby along the trails.

Schools, which are conceded to be the chief factor in holding the people together, are conducted in all large communities. A farm around which all school life centers has been established at these settlements. Equipped with bulls, plows and simple wood-working tools the farm offers the boy an opportunity not only to learn to care for and use the things which can overcome the cogon grass, but to become one of the communal workers of a piece of land where all the products are divided and each pupil takes his share. The land is well arranged in neat fields, and planted in corn, rice, camotes, cow peas, vegetables, bananas, pineapples, papayas, and coffee. The occa-



Photo by the author.

Plowing on a school farm.

sional share received by the pupil often constitutes the food of the entire family for several days. The many small farms which surround the settlements are so conspicuously like the school farms as to be directly credited to the influence of the school.

It is a real pleasure to come upon one of the sixteen Bukidnon school farms in the midst of the miles of fine agricultural land. One cannot but admire the teacher and his work. A group of boys at one of these schools was receiving rations of beans, corn, and camotes for a day's trip to another school to play baseball. School buildings consisting of schoolhouse and teachers' homes are located on the farms. The neat attractive cottages where the teachers keep open door to passing officials are an influence for the good of the country that will be felt

almost as much as the school work. Along the sides of the deep ravines are seen small fields of hemp, while about every house thrifty coffee plants are growing. Hemp and coffee of excellent grade now go down to the coast in some quantities.

As we ride across the land which formed the old Barton ranch, we cease to wonder why he settled there. It is a region of vast possibilities. As transportation into the country develops, this land will be rich in cattle and coffee, and in the happy homes of a people content to till the soil.

“Through industrial efforts in education and through other influences at work in the world to-day the time may come when intellect and manual labor will be united. We are always in these days endeavoring to separate intellect and manual labor; we want one man to be always thinking, and another to be always working, and we call one a gentleman and the other an operative; whereas the workman ought often to be thinking and the thinker often to be working, and both should be gentlemen in the best sense. As it is, we make both ungentle, the one envying, the other despising, his brother; and the mass of society is made up of morbid thinkers and miserable workers.”—JOHN RUSKIN.

“Making, or manual training, has done more for the human race than the exercise of any, if not all, of the other modes of expression. It is absolutely indispensable to normal physical development; it has had a mighty influence upon brain building; it has cultivated ethics as a basis of all moral growth.”—Colonel FRANCIS W. PARKER.

Technical instruction must be regarded in the first place as a means of character-training, and it must be supplemented by other forms of instruction with a view to making it as many-sided as possible. In the life of great economic groups and of nations there are moments, and there are the critical moments, in which neither knowledge nor skill, but character, decides the day—character that has learned to regard its own egoistic interests as of no account when their sacrifice is demanded by the welfare of the community to which we belong, the welfare of the service that we have chosen, the welfare of the subordinates intrusted to our care.—Dr. GEORG KERSCHENSTEINER, Director of Education, Munich, Germany.

In view of work being done in the General Office of the Bureau of Education in collecting and applying designs of native origin in the industrial work, it is interesting to note certain statements by the editor of "The Craftsman." "The Craftsman" is edited by Gustav Stickley in New York City and is to-day probably the foremost American magazine devoted to the arts and crafts. Mr. Stickley himself, as well as other members of the editorial staff, have made numerous visits to the different European countries for the purpose of studying the craft work there. The following notes are excerpts from a résumé of these trips.

"The best work to be found in England, France, Belgium, and Bavaria were the close replicas of the old peasant potteries and porcelains, fabrics and embroideries."

"Austria was producing a great many of her ornaments and household fittings from peasant models, the factories and the art societies vying with each other in copying antique designs which have been gathered and put into museums and held as precious curiosities. In Hungary, the crafts to-day seem the outgrowth of the crafts of yesterday, with the result that there is nothing more interesting on the continent than the handicraft work seen in Hungarian shops."

"Along the coast of France and the adjacent country the craft idea of the peasant has projected itself into the factory work; that is to say, the same models have been removed from the houses to the factory. In Belgium there is to-day a so-called modern factory as there is in the province of Flanders, and the beauty of these products is that they are the actual outgrowth of the old peasant arts."

"In illustrations given in these articles we have sought to make clear how definitely the best work to-day of the Continent is alive with forms and designs of peasant workmanship as it exists to-day or existed in the past. In many instances not only are the pottery and porcelain made from old models but the draperies, the tapestries, the carpets, the inlaid designs on furniture, the metal work used in these countries to-day are reproducing the old ideals of peasant handicrafts."

Mr. Stickley's entire article as published in the June number of *The Craftsman* for 1912 is well worth the study of those interested in good craftsmanship. His assurance that the good things in Europe come through an application of old models and designs from among the simple people is an encouraging report to those who are working to establish a place in the industrial work here for old designs of native origin.—S. C. J.

EDITORIAL AND OFFICIAL.

THE United States Bureau of Education has published an article written by Dr. Thomas D. Wood, Professor of Physical Education in Teachers College, Columbia University, New York, on the physical defects of American school children. According to the findings of Dr. Wood, fully 75 per cent of the 20,000,000 school children in the United States need attention for physical defects which are prejudicial to health and which are partially or entirely curable. It appears that about 400,000 are suffering from organic heart disease. Fully 1,000,000 have now, or have had, tuberculous disease of the lungs. About 1,000,000 have spinal curvature, flat foot or some other moderate deformity serious enough to interfere to some degree with health. Fully 1,000,000 have defective hearing. About 5,000,000 children have defective vision. An equal number are suffering from malnutrition, in many cases due in part at least to one or more of the other defects enumerated. Some 6,000,000 have defective teeth which are interfering with health. Several millions of the children are afflicted with two or more of the defects mentioned above.

Medical Inspections
in the Public
Schools.

School authorities and organizations which have interested themselves in public health have begun to understand the necessity for taking steps to correct the physical deficiencies of school children insofar as they may be remedied. Already over 100 cities in the United States have organizations for the care of health in the public schools. The more enlightened communities have provided definitely for medical inspection of the public schools.

No health survey of the Philippines has been made from which definite conclusions could be drawn as to the physical defects of Filipino children. It is believed, however, that the situation here is fully as alarming as that in the United States and that as fast as funds may be made available medical inspection should be provided. In Cebu Dr. Arlington Pond and Dr. Louis Schwartz have examined the eyes of the pupils in the public schools of the city and their reports show that 15 per cent of the children enrolled in the primary grades are suffering from trachoma. In the

intermediate and secondary classes 10 and 5 per cent respectively are suffering from this disease. In Manila 3.35 per cent of the children in the public schools were found to be similarly afflicted.

The most important national resource of any country is the health of its people, and it is very necessary that the schools be not only sanitary and healthful, but that every pupil be given every possible opportunity to escape weakness and disease, and to attain to the highest possible physical efficiency. Here is the field for that general physical training which means the physical welfare of the school children and of the nation.—J. D. D.

It is of great interest to note a few of the most important resolutions passed at the July convention of the National Education Association and thereby obtain a vantage point in the comparison of our own educational activities with the best and most recent educational movements in the United States. Inasmuch as the welfare of the community depends upon the health of the citizens, and the utilization of the play instinct is being more and more recognized, it was resolved that all school districts should secure grounds in proportion to the size of the building so as to provide a place for play and for instruction in gardening. In our system the matter of adequate sites, of school gardens, and of school games has already passed the "resolving" stage and has been crystallized into definite form by administrative action.

The association recognized the fact that liberal education has failed to meet the demand for greater practical efficiency on the part of the pupils and favored such changes as should assist the pupil in applying his knowledge to life conditions. It also admitted that vocational training was necessary and recommended that the Federal Government make an appropriation for the ultimate improvement of the home, shop, and farm through vocational training, and that the association appoint a committee to study the problems of vocational training. While Congress is being importuned to devote money for this purpose and while a committee is being appointed to study this question, the islands have been spending a large share of their school revenue on industrial work and have been working out the problems connected therewith for several years past.

The association also urged the necessity of definite progress along the line of vocational guidance, that such guidance be carried on under the direct control of a vocational adviser, and that

courses of study be so enriched as to make it possible to discover the tastes, tendencies, and abilities of the child previous to the time when such vocational decisions are to be made. While our courses have been enriched along vocational lines, yet no concerted action has been taken in respect to vocational guidance. Considerable work has been accomplished by individual teachers and individual schools in advising pupils in respect to the vocations for which they seem best fitted, but the time is now ripe, here as well as in the United States, for a general movement toward the intelligent directing of pupils into vocations for which they shall be well adapted.

In many cities, vocational guidance originated from the activities of teachers in securing suitable positions for their pupils upon leaving school. It has developed past that stage until now it concerns itself principally with advising both pupils and parents as to the best vocations for the children to enter. This entails the collection and distribution of data upon the different vocations and a plan for keeping in touch with pupils after they have entered their life work. It involves the enriching of the vocational content of the courses of study and naturally carries with it, more or less, the correlated work of securing employment for pupils needing it.

It is proposed to take up this matter in the coming issues of the *CRAFTSMAN* by means of a general article covering the origin, development, and extent of the movement in the United States, to be followed by special articles on the various vocations open to Filipino youths. These special articles will treat in detail the following features of the different vocations: the qualifications required, the nature of the work, the opportunities in respect to pay and advancement, and other points of value and interest. By means of these articles, teachers and parents will have valuable data in available form for use in guiding boys and girls into suitable vocations.—W. W. M.

By a recent circular of the General Office, No. 97 of the current series, the attention of superintendents and teachers has been invited to the fundamental bases along which it is hoped to develop and strengthen one of the important industrial branches now being taught in many of the primary schools. Between 1906 and the present time some 300 primary woodworking shops have been established in the various school divisions, Pangasinan Province being in the lead with 35 shops. Many of these shops are well

**The Woodworking
Shops**

organized and well equipped, accommodated in suitable quarters and directed by efficient teachers; but there are some which are deficient in one or all of these points.

Circular No. 97 amplifies in many respects the official texts and circulars on the subject and gives more specific instructions relative to the essentials of the woodworking courses than were previously prescribed. Specific working directions are given for all the required exercises in the regular course, while in the list of subsidiary courses the making of tools for home use, the construction of school furniture, and the making of bamboo and rattan furniture are outlined in considerable detail. These latter are optional for such primary schools as are by location or otherwise specially prepared to give them with success. The adaptation of the course to the special needs and requirements of the many municipalities where it is expected to establish such courses and the varying conditions which there prevail should result in a general improvement in the character of the work which will hereafter be accomplished in this industrial branch.

The range of work which may be accomplished under the provisions of this circular is very wide and diversified—from the more simple articles with an equipment costing forty or fifty pesos to the regular woodworking course, which requires an expenditure of more than two hundred pesos for equipment, depending upon the number of pupils receiving instruction.

It is considered inadvisable to establish any one of the woodworking courses unless sufficient funds will be available to maintain it. Plans made in this connection should take into definite consideration these points: suitable quarters, either constructed or rented for the purpose; sufficient equipment and materials; a properly qualified teacher; and financial resources adequate to support the type of woodworking course selected. When one of these essentials is lacking, it is almost certain to produce illy trained students and a lowering of the industrial standard. All the above points should be considered, one in relation to the other, and their proper balance and mutual interplay secured. Where this cannot be accomplished, it is preferable from every point of view to have pupils of Grades III and IV engage in some other line of industrial work.

The purpose of the woodworking course has been emphasized in many official communications and publications in the past. A repetition of the reasons for its existence in our industrial program may not be out of place in this connection. The training of the mind, eye and hand through the use of tools is in-

ferior to none other; manual dexterity is highly developed and quickness of judgment is thoroughly acquired; and a knowledge of woods is obtained which will be invaluable from an economic standpoint. A knowledge of tools and their uses will be the key which will open countless opportunities to young men in the near future. Construction work of different classes is increasing to an extent hardly anticipated by those most interested in the industrial development of these Islands, and in minor or major capacities students pursuing primary shop work can become important factors in this industrial expansion.—L. R. S.

There has for some time been a persistent demand on the part of the representatives of the Filipino people for the establishment of a nautical school. Such a school was in existence from 1898 to 1907, when it was closed. The

The Nautical
School.

establishment of a nautical school with a training ship and a full course would throw such a financial burden on the Government that its establishment is entirely out of the question at the present time. The Government, however, realizes that the demand of the people is a just one and has taken steps to provide the necessary instruction in connection with the Philippine School of Arts and Trades. Not all of the details of the plan have yet been worked out, but in general it may be said that only those candidates will be admitted who have completed the intermediate course of study. The nautical class will cover a period of two years, after which the student will be obliged to follow the sea for a year and a half before receiving papers qualifying him as a ship's officer.

The course of study will follow in general the outline given below:

FIRST YEAR.

FIRST SEMESTER.		SECOND SEMESTER.
Algebra	} Applied formulas.	Mathematics.
Geometry		English.
English.		Seamanship.
Seamanship.		Drawing.
Geography, Philippine.		

SECOND YEAR.

FIRST SEMESTER.		SECOND SEMESTER.
Trigonometry, applied.		Drawing.
Seamanship.		Seamanship.
Navigation and astronomy.		Navigation and astronomy.
Physics.		Physics.

While the Bureau of Education will handle the academic instruction, the technical instruction will be given by employees of the Bureaus of Navigation and Customs who will be detailed for this purpose. Later announcement will be made as to the time of opening of the school, which will probably be in June, 1913. However, since the demand for the school is urgent, it is possible that it will open the first week in January, 1913.

"Two of the direct results of art instruction and manual training," as Professor Charles A. Bennett puts it, "are, first, power to do, and, second, ability to appreciate what is done by others."

The only path to real state-community is to accustom the children from their earliest years to do their work not only for their own personal advantage but also for the advantage of their youthful companions. Only thus can we hope to develop the two great fundamental virtues of devotion to aims outside ourselves and of consideration for the interests of others. And only thus will it in all probability be possible to preserve our great modern constitutional states from the dangers that threaten them through their own industrial, economic, social and political development.—Dr. GEORG KERSCHENSTEINER, Director of Education, Munich, Germany.

Trade schools in order to be a success must have a distinct individuality and a definite object of their own. They are neither, primarily, to quicken mentality nor to develop culture; those things will come in the regular order. They are not to train mechanical and electrical engineers; the literary and technical schools are doing that very amply. They are not to develop foremen; leaders will develop themselves for they will forge ahead of their fellows by reason of their own ability. Trade schools should contain nothing which naturally leads away from the shop. They are to train workmen to do better work that they may earn a better living for themselves and their families.

Trade schools should be more like the factory than the school-room. However, English and mathematics should be emphasized. They should be put in charge of craftsmen who can teach, rather than teachers who are primitive mechanics. Make the instruction largely individual.—C. W. C.

The acquiring of knowledge and technical skill, and the building up of character, should go hand in hand. Industrial education is more than giving the pupil the technique. It is only valuable to society when it instills in the pupil noble incentives in using this newly acquired power. With the awakening of his dormant powers and the discovery of his special aptitude along certain lines of work must come the increasing proper incentives in their use. To the alert, tactful instructor, the shop work offers many opportunities to eliminate those characteristics in the pupil which tend toward his failure as a citizen, workman and member of society; and to help the pupil cultivate those qualities of character which make for the welfare and high standing of our national life.

To state briefly:

(1) The pupils in the elementary grades should have instilled in their minds the value of their school studies. Concrete illustrative material, stereopticons, and visits to manufacturing plants and commercial centers are valuable aids.

(2) The boys in the upper grammar grades should receive a concrete knowledge of the agricultural, industrial, and commercial world before they choose or attempt to specialize in any of the skilled vocations. Society will be the richer and the boy the happier for it. There will be less misfits in the agricultural, industrial, commercial and professional world.

(3) Too early specialization on a vocation is unwise, because it would only fit the boy for low grade labor. The boy needs the firm foundation of a general industrial education for his future advancement and welfare. Society needs skilled and intelligent workers; the unskilled and low grade labor market is already overstocked with workers while the manufacturers are in need of more skilled workmen.—CHARLES MARTEN, Director of Industrial Arts, Cleveland, Ohio.

“The best construction necessarily includes artistic elements, i. e. soundness of structure, propriety of material, suitability to purpose, good proportions, and good relationships.” Manual training projects, to be successful, must be worked out with these ideas of construction in mind.—Dr. JAMES P. HANEY.

That we do not have more trade schools, is not because we cannot afford them. The time is coming when we will find that we are too poor not to have them. Anything which makes a workman take pride in his handiwork makes for conservation.

DEAN RUSSEL.

INDUSTRIAL NOTES.

SAMAR BASKETS OF THE ZAMBALES TYPE.

JOHN F. MINIER, Industrial Supervisor.

Baskets of the Zambales type with a set of outer ribs of blackened bamboo are now made in Samar. These baskets are of small size, not being over 5 cm. in height. They are neat in appearance and are made only of materials carefully selected and prepared. Their popularity has caused the demand for them to be considerably greater than the supply. They are made to nest and as many as five of them may be shipped in a package 15 cm. square and 5 cm. high. Two models of these baskets are shown in the illustration.

The standard measurements of the basket with vertical sides are as follows:

	Centimeters.
Height (including the rim).....	5
Height from standard to rim	3.7
Height of rim	1.3
Width of rim	1
Diameter at top (including rim)	12.5
Diameter at bottom	11

The basket may be made of nito, rattan, bamboo, banban and air roots. There should be 8 spokes 22 cm. long and 3 mm. wide, 16 spokes 10 cm. long and 3 mm. wide, and 32 spokes 8 cm. long and 3 cm. wide. The longest spokes should taper gradually from each end to 2 mm. in width at the center. The basket is begun in the same way as the work basket as shown in Fig. 1, Plate XIV of the July issue of *THE PHILIPPINE CRAFTSMAN*, except that 8 spokes are used instead of 16. After a measure of 5 mm. is woven

with two weavers, three rounds are made with the triple weave and the 16 spokes 10 cm. in length are inserted. Three more rounds are woven with two weavers to hold the 16 spokes in place. Seven rounds are now made by using the triple weave, after which 32 spokes of the 8 cm. length are added. These spokes should always be bound in place by using two weavers. The weaving is now continued until the desired diameter is obtained. The bottom should be decorated, with spiral and arrowshaped designs, and the like.

The sides are usually begun with the triple weave. After several rounds have been woven 2.5 cm. of the side should be done with two weavers of the same color. 32 blackened bamboo spokes not more than 3 cm. in length and 4 mm. in width are inserted in the triple weave in such a manner that the lower ends of the bamboo are hidden from sight. The tops of the bamboo spokes are now bound in place by weaving around with the triple weave. If a small number of bamboo spokes are used they may be made more than 4 mm. in width. The rim is slightly elliptical and is 1.3 cm. high and 1 cm. thick. When the design has been put on the rim it should be so uniform that the beginning and end can not be detected. Only the finest and best materials should be employed and the workmanship should be of the finest.

CORN DEMONSTRATION IN CAPIZ.

The first corn demonstration in the province of Capiz was held on September 6, 1912, at the provincial



Two Samar baskets of the Zambales type.

capital. The report of Mr. John C. Early, who is in active charge of the corn campaign in that division, shows that the demonstration was a "real corn fiesta," and that it was attended by a large number of the people from outside towns.

A prominent place in the program was given to addresses by the following leading citizens of Panay: Mr. R. R. Hancock, general manager of the Philippines Railway Company; Mr. C. E. Wright, Division Superintendent of Schools; and Mr. Sam W. Sherard, Agricultural Inspector, Bureau of Agriculture. Mr. Hancock spoke of the agricultural possibilities of Panay and told of the results which have been secured in other countries by the extensive and intensive cultivation of corn. Mr. Wright spoke of the general trend toward practical education and of the ever increasing emphasis that is being placed by the Bureau of Education on vocational instruction. He also explained the corn campaign in detail. Mr. Sherard spoke on corn. He explained the nature of the plant, the kind of soil needed, the selection of seed, and the planting, cultivation, and harvest of the crop, as well as

the food value of different kinds of corn. His lecture was illustrated by samples of corn and specially prepared charts.

After the program, the provincial and municipal officials of the provinces were invited to the department of home economics of the provincial school, where a daintily served luncheon of corn products had been prepared for the visitors by the girls of the school. Mrs. Wright, the wife of the Division Superintendent, was in charge of the preparation and serving of the lunch.

Among the prominent visitors at the corn demonstration were the Honorable Francisco Santa Maria, Judge of the Court of First Instance; Governor Altavaz of Capiz; Third Member Arnaldo of the provincial board; twenty-five municipal presidents; and a large number of up-to-date farmers from all parts of the province.

The booths in which the demonstrations were conducted were fitted with equipment to illustrate every feature of corn and its use, from the selection of the seed and means of cultivation to the consumption of the various corn foods.

CULTIVATION OF AIR ROOTS.

In response to a communication regarding the possibility of cultivating various species of Araceae for the fiber produced by their air-roots, Mr. Elmer D. Merrill, Botanist, Bureau of Science, states that in all probability but two species are adapted to conditions found in and about towns in the Philippines; that is, species that will thrive under cultivation. These are: *Raphidophora merrillii* Engl., which is now found in and about most towns in

plants; that is, those that thrive only in rather dense forests, and in regions where the rainfall is fairly well distributed throughout the year. It is not believed that any of the above can be cultivated with profit in or about the average low country town in the Philippines.

As to *Raphidophora merrillii* and *Scindapsus aureus*, both grow well in regions like Manila and vicinity where the rainfall is interrupted by a long dry season; if attempts are made to cultivate any of these plants,



Raphidophora merrillii Engl.



Scindapsus aureus Engl. and Krause.

the Archipelago, wild and cultivated, an endemic, widely distributed, and well known species; and *Scindapsus aureus* Engl. & Krause. The latter is a coarse vine, with very large, pale-green leaves mottled with yellow or paler green, quite common in cultivation in Manila, and in some of the larger towns. It is a native of the Solomon Islands, but was introduced into the Philippines some years ago; it is never found growing wild here. *Pothos ovatifolius*, *P. philippinensis*, *P. rumphii*, and *Raphidophora perkinsae* all are sylvan

it is believed that these two are the ones that will give the best results. The former is generally known as "tibatib" or "amlong," but the latter has no definite native name.

Both are very easily propagated by cuttings; it is only necessary to cut the stems into sections, each section showing at least two internodes, and then root the cuttings in wet sandy soil. Naturally they grow on the trunks of trees, though sometimes, in towns, trailing over stone walls; presumably, in practice, the only feasible method of cultivation

will be by planting them about the trunks of shade trees. In very dry weather they will naturally thrive better if occasionally watered. Common "tibatib" grows naturally in thickets, etc., without any cultivation, but will undoubtedly respond to attention, such as the destruction of weeds about the roots, occasionally stirring the soil, watering, etc.

There are no data available on which to base an estimate of the time necessary for the plant to produce long air roots. Plants started from cuttings will in all probability not yield long roots within a year or so, for the stem must make its growth in length before the necessity arises for the production of long roots. Old plants, thoroughly established, will doubtless produce new long roots in a few weeks or at least in a few months. Naturally, in removing the roots, care should be taken not to injure or destroy the plant itself. The air roots are produced from the nodes (joints), and the short horizontal ones serve to hold the plant in position on its supporting host. The much elongated pendulous ones which yield the fiber supply the plant with water and food. Eventually most of these reach the ground and root at their tips. Naturally when these long roots are removed new ones are produced either from the same or from different nodes, and having a well established plant on which to draw for nourishment, the growth of these new roots will be comparatively rapid. It is suspected that the roots make most of their growth in the rainy season.

EMBROIDERY NOTES.

In *Modern Priscilla* for August, 1912: The Irish crochet bag, page 5, is pleasing, but would be better still if the bowknot, a much hackneyed motif, were omitted. A quiet

space of the same background stitch with another small group of roses where the fern stems come together would be less commonplace and would give unity of design. There seem to be too many different motifs for such a small space. The Venetian crochet, page 6, is good. In Fig. 5, however, it would be better to shorten the tabs as they curl and launder poorly when long.

Of the punched work on page 7, Nos. 12-8-5, 12-8-6 and 12-8-4 are the best. The bunch of grapes in No. 12-8-1 looks lonesome and lacks unity of design. The flowers in No. 12-8-7 seem too large for the space allowed for the design. The use of a pot of flowers to ornament a sofa pillow, even though it is of old colonial design, is open to criticism.

Of the crochet pillow tops, page 8, No. 12-8-8 is good; but in No. 12-8-9 the apparent use of a section of the alphabet as the center of interest is giving too much importance to a commonplace thing. Neither of the embroidery designs on the same page is satisfactory. The design on No. 12-8-10 shows a monotonous use of an uninteresting unit and the whole is too compact and hard in line and figure. The arrangement of stems in design No. 12-8-11 is a poor, distorted one. The color scheme might redeem the other units of the design.

Of the gold thread bags on page 9, Fig. 1 is very nice in shape. Fig. 3 would be a little too long for the width when drawn up, and Fig. 4 is not at all attractive; the edge of the flap is particularly poor in shape.

The stole on page 10 is pretty and suggests a new application for Roman cutwork or some of the other hand embroideries.

The embroidery designs on page 11 are pleasing with the exception of No. 12-8-18, which is ordinary. No. 12-8-19 offers the practical suggestion of making the center top

of the cushion of open work; that section of a cushion usually wears into unsightly pinholes long before the other parts of the cushion are effected. No. 12-8-23 would be improved by using a more simple curve for the tendrils and working them closer to or over the edge of the upper boundary line of the design.

Of the underwear on page 12, only No. 12-8-30 is worth considering. This is a rather interesting border. No. 12-8-28 gives the appearance of having been cut off at the top and the detached sprays at the sides show a lack of coherence in design. The flounces, Nos. 12-8-31 and 12-8-35, are pretty; the others are not so good. All the chrysanthemum designs on page 15 are very nice.

The rabbit motif in such an obvious arrangement as used in the designs on page 17 seems better suited to decoration of children's things than to table linen, even when used for the purpose suggested.

The shirt waist designs on page 19 are pleasing in themselves but do not conform well to the structural lines of the garment. An additional spray reaching out toward the shoulder would improve No. 12-8-56. No. 12-8-57 could be placed upon the cloth in a more slanting position in order to give greater width at the top and less at the bottom, and No. 12-8-58 would be improved by adding a little to the length at the bottom.

The designs in *Modern Priscilla* for September, 1912, are very nice as a whole. Only the following changes are suggested:

In the infant's robe, page 5, the motifs in the lower part of the panels are pleasing, but the units in the upper part could have better placing and the pendant basket of flowers seems unsuited to its use; the small sprays with the bowknot would be quite enough.

The design on collar No. 12-9-16,

page 9, is good, but the shape of the collar itself sacrifices good construction to novelty. The "bite" out of the back is displeasing. There is also a lack of correlation between the straight band and the corner motifs in collar No. 12-9-18. The latter motifs are nice and could be repeated in the back of the collar with a more pleasing result. Again novelty seems to have taken precedence over good design.

In the luncheon set on page 17, the edge of the largest doily in No. 12-9-52 is too heavy. Either of the other two arrangements is better.

On page 8, Nos. 12-9-10 and 12-9-14 are particularly pleasing.—S. C. J.

COORDINATION OF SHOP AND CLASSROOM.

The radicals in industrial education plan their courses solely for industrial efficiency, paying no attention to training for citizenship. The conservatives outline their educational policies so as to train for citizenship with no regard for industrialism. The educational policy in the Philippines, however, aims at giving a training that will prepare the pupils not only for civic responsibilities but also for industrial efficiency.

Shop work alone may produce good workmen. Academic work alone may produce good citizens. Our combined shop and academic work will produce good citizens who are at the same time good workmen. To obtain the maximum good out of the combined teaching of industrial and academic subjects, a close coordination of the shop and classroom must be made. Usually, the academic teacher possesses but little knowledge of shop processes and frequently shows even less interest in what goes on outside of his classroom. Unless the shop work receives steady, hearty, and judicious

coöperation in the classroom, the best results will not be obtained.

As an aid toward bringing shop and classroom into closer sympathy, a regular schedule of visits to the shops has been arranged for all academic and drawing teachers of the Philippine School of Arts and Trades. This school contains nine shop departments and nine teachers in drawing and academic subjects. Each teacher visits at least one shop per month and in the course of the nine school months makes a complete round of all shops during the school year. The results of these visits are various. A new teacher learns at once that the shop work is not a mere side issue, and imbibes the spirit underlying the school work in far less time than otherwise possible. The older teachers keep in touch with what is going on in their own school and acquire material for use in their English and arithmetic teaching. The pupils learn that their shop work is of as much importance as their academic work and naturally take increased pride therein. The shop instructors realize that their work is being upheld in every possible way and are thus stimulated to their best efforts. In short, these visits are doing more toward co-ordinating shop and classroom than any other single feature of the school program.—W. W. M.

NATIVE SEED CORN.

During the past year there has been a general demand for information regarding the relative values of different varieties of corn, of various types of ear, and of seed from different regions. The experience of farmers has been that seed corn brought from one locality to another, will often not give good results the first year in the new locality.

At the Nebraska agricultural ex-

periment station it was demonstrated after a three years' test that local native corn averaged 6.3 bushels more per acre than the corn from Illinois and Iowa. A more striking result was secured later when varieties representing three degrees of acclimatization were grown in a comparative test. One group was grown from prize ears from Illinois and Iowa and produced 39 bushels per acre. The second lot was grown from selections of corn grown in other parts of the state and a yield of 45 bushels was secured. In the third experiment, the seed corn was secured from a collection of varieties grown for several years by farmers near the experiment station. An average yield of 48 bushels was secured from this seed.

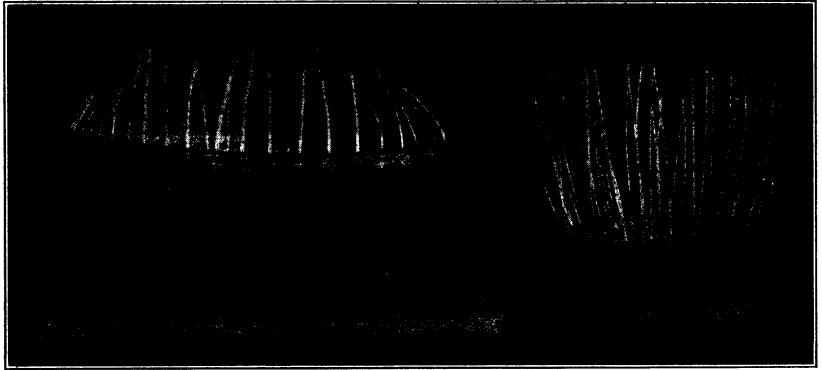
These experiments plainly indicate the value of native seed, and prove that seed from a distance produces much less corn than varieties already acclimatized. On the same principle, seed from different sections of the Philippines would necessarily undergo a process of acclimatization before the best results could be secured. It is to be concluded from this that it will be safer for Filipino farmers to use their native seed than to try importing seed even from other sections of the Philippines.

There is an excellent opportunity for the improvement of acclimatized seed corn by careful selection. If the corn is wisely selected, a good native variety can be developed which will with time improve in yield—N. H. F.

USING MOUNTS IN MAKING BASKETS.

Mounts are very necessary in making certain forms of baskets to prevent the bottom of the baskets from twisting out of shape when the sides are being woven.

A very simple contrivance (see illustrations) is an ordinary board larger than the bottom of the basket



Board basket mounts.

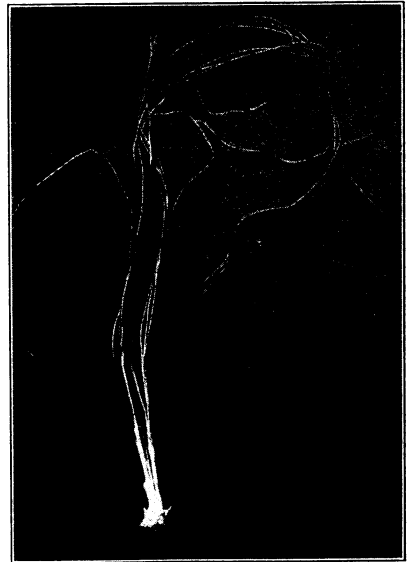
with small holes bored at intervals of about two inches. These may be placed in an elliptical or circular form depending upon the shape of the bottom of the basket to be woven. The basket is secured to this board by strings or cords passed through the holes from below over the rib and back through the same hole, carrying the same cord all the way around. Another advantage of this mount is that it furnishes a plane surface from which the horizontal and lateral measurements of the basket may be taken, enabling the weaver to make a more symmetrical basket than is possible otherwise. In certain baskets like the book baskets and others which have perfectly plane bottoms the board may be fastened inside instead of outside. In this case it must be made the exact form of the bottom desired, as it serves also for a mold in fashioning the basket.—ULYSES S. ANDES, *Normal School*.

“COBBOOT.”

The Industrial Museum of the Bureau of Education recently received from Mr. Gil Raval, industrial supervisor for Ilocos Norte, specimens of a grass known in Ilocano as “cobboot.” This is used in the schools of the division for making slippers

and seems well adapted for such purpose. It has been identified as *Ischaemum angustifolium* and has also been collected by the Bureau of Science in the Provinces of Cagayan, Nueva Vizcaya, Pangasinan, and in the Mountain Province. In the latter it is known as “pueng” (Igorrot). It is therefore believed that this grass is of general distribution throughout northern Luzon.

In India the grass is utilized for making paper, but such an industry

Cobboot (*Ischaemum angustifolium*).

would not be advisable for the Philippines as a great amount of machinery is needed for a modern paper mill.

Mr. Raval gives this information about cobboot:

"The plant grows best in dry, open, grassy slopes. The average height of a mature stalk is three feet. The leaves are long and narrow. It bears flowers during the months of May and June. In the months of August and September it is in full growth and is cut to be made into rope. Slippers are made of it in the schools.

For rope, the plant is cut at its base; it is dried in the sun for three days and is then ready to be twisted. For slippers, the base of the stalk one foot long is used. The straw to be twisted or woven must be kept soft and moist by wrapping it with banana petioles. The material is used for both the upper and under soles of slippers and is very strong.

It may be added that this grass is woolly at the base and that its flowering spikes are from 2 to 4 inches long, of a light brown color, hairy, and easily blown away by the wind.

Specimens of the plant may be obtained by interested parties on application to the Bureau of Education.

THE NESTING OF BASKETS.

In Volume I, No. 1, of this journal, in the article on Philippine Baskets, the point was brought out that freight rates to Pacific coast ports and on railroads in the United States were by hundred pounds as applied to baskets. The effect of this rate lessens the desirability of making baskets so that they will nest. The General Office of the Bureau is in receipt of a letter from Mentzer-Piaget Co. of Chicago, Illinois, the body of which is quoted herewith:

"Regarding freight.—The ocean

proportion of freight from Manila to the Pacific Coast Ports, is \$0.75 per hundred pounds, and the rail proportion is \$1.50 per hundred pounds to any common point east of the Mississippi River. This rail proportion of course applies only to shipments originating in the Orient; therefore you could figure \$2.25 per hundred pounds as the freight on baskets from Manila, to Milwaukee, St. Paul, New York, or any point designated on the tariff issued by the Trans-Continental Freight Bureau. This tariff we are mailing you a copy of in today's mail, and we hope that it will be of assistance to you.

"*In reference to packing.*—These goods can either be boxed or baled; our Japanese products usually are packed in wooden cases, while our Chinese baskets are usually packed in bamboo loose woven hampers which are afterwards covered with a coarse woven matting; the ocean and rail rates are the same on either kind of packing.

"*In reference to nesting of baskets.*—The custom of manufacturing a certain style of basket and nesting one inside of the other is not a good commercial idea, for the reason that the one size is not as good a seller as another. This idea of nesting baskets of one style, one in another, was adopted at the time when our ocean freight was on the cubic foot basis; therefore the baskets that were nested did not cost any freight on the ocean, and for that reason the temptation was great to manufacture a lot of baskets in sizes that are practically unsalable. The samples the writer saw when in Manila were styles that would readily sell, but such baskets as desk baskets, waste baskets used for commercial purposes, would not meet with a ready sale for the reason that this market is already thoroughly covered with products that are more suitable and much lower in price than what could

be produced, we think, in the Philippines. Odd shaped baskets, or work baskets, and fancy baskets in original designs would be much better and would command a better price than baskets that would have to compete with merchandise already in the market."

The superintendent of schools for the division of Isabela has issued a circular giving a schedule and instructions pertinent to the industrial work to be accomplished by the schools of that division. The outline, which is intended to be used in connection with a provincial industrial outline heretofore issued, gives complete and explicit directions as to the manner and time for doing all the industrial work, with the exception of gardening. In some respects this circular is in advance of other division industrial outlines already issued, and the ideas contained are worthy of being included in future industrial outlines for other divisions.

One of its special features is an industrial vocabulary for each grade of the primary course. These vocabularies are in keeping with the work prescribed for the respective grades and, if properly used, the teachers should be able to make the industrial work a basis for supplementary language or conversation drill.

In further carrying out the idea of having the industrial work supplement the academic work being done, each pupil is required to keep an accurate cost tag showing the amount and cost of all materials entering into the making of each article. The measurements of all articles are shown by means of drawings, and as a result of this and the cost tags the pupils will become familiar with costs, profit and loss, and linear measurements, and will learn something of mechanical drawing.

That part of the circular that pertains to needle-work is very complete; not only are the instructions explicit and the measurements exact, but the suggestions regarding the sanitary conditions under which the pupils should work and live are excellent. With the training prescribed, the pupils of the division should be able to do excellent needle-work.

Owing to the fact that the province of Isabela is remote and the cost of transportation high, the price of imported household furniture is excessive. To relieve this condition and to allow the pupils to have training in the use of carpentry tools, the pupils assigned to the primary shops are making two excellent types of chairs. One of the types is known as the bamboo chair, while the other is called the rattan chair. Both of the chairs are servicable and there is quite a demand for them.

It is probable that actual experience will suggest several modifications and eliminations, but the circular as a whole is so well arranged that it will undoubtedly prove of great benefit to the division.—
R. B. R.

PAINT.

It may be useful to know that a gallon of paint will cover from 450 to 630 superficial feet of wood. On a well-painted surface of iron, a gallon of paint will cover 720 feet. In estimating painting to old work, the first thing to do is to find out the nature of the surface, whether it is porous, rough or smooth, hard or soft. A correct estimate on repainting woodwork can not be made from the quantities only; a personal examination ought to be made in every case where there is much work to be done. A great many painters trust to the quantity; the consequence is nothing is allowed

for removing old paint, for scouring, or for stopping cracks.

Painting can be done well and artistically, or indifferently, and few trades allow of greater scamping. In first-class work, after the first two coats have been put on, the paint, when dry, should be rubbed down with pumice stone before the finishing coats are put on. Inferior painting is so common that it has a demoralizing effect on painters of the day. The quality of the material, especially the white lead, has much to do with the permanency. We find painting done on old work without any cleaning, stopping, or even pumicing. A slovenly and inartistic class of grainers is also met with, who repaint and regrain on work that ought to be well rubbed with pumice stone or sandpaper before the first new coat is laid.

For painting three coats, the following materials are given for 100 superficial feet of new work: Pigment, 8 pounds; boiled linseed oil, 3 pints; spirits of turpentine, 1 pint; the work taking three men for one day. According to Saxton, 45 yards of first coat, including stopping, will require 5 pounds of white lead, 5 pounds of putty, 1 quart of oil. The same quantity of each succeeding coat will require the same allowance of white lead and oil. The best materials will last for seven years, but the ordinary painting seldom lasts three.

MALABON, RIZAL, CORN DEMONSTRATION.

A very successful corn demonstration was held at Malabon, Rizal, September 7, 1912. It is estimated that five thousand people attended this demonstration. Corn foods were prepared and served from eight attractive booths, which were well ornamented and so arranged that the public could have free access to them. Corn foods were

served and many recipes were distributed to the public. A "Corn Queen" and an "Indian Girl" were features of the demonstration. The cost of the demonstration was ₱170. The demonstration was attended by the Acting Governor-General, Newton W. Gilbert, and many other officials and prominent people from Manila.

In connection with plans under way in the division of Leyte to prepare and select articles for the carnival exhibition of 1913, detailed rules have been issued to teachers for industrial contests which are to be held in the several school districts of the province. Both municipal and district exhibits have been so arranged that the quality of work done in various municipalities and districts will be judged under several headings, as baskets, lace, embroidery, crochet, plain sewing, abaca work, hand weaving, garden products, and miscellaneous. The preceding articles constitute the main lines of our industrial work as at present organized, and an efficiency classification is to be given on this basis. Ten articles from each heading will be expected from each district and they will be given a weight varying from 5 to 20 points. The municipality receiving the largest number of points under the industrial groups previously mentioned will be awarded a trophy known as the "Casalla Banner" in indication of superior industrial efficiency and attainment for the division.

CORN DEMONSTRATIONS IN PALAWAN.

Plans have been made for holding large provincial corn demonstrations in Cuyo, Puerto Princesa, Coron, and Agutaya. From these central points the demonstrations will branch out into the small municipalities and barrios.

REPAIR PARTS FOR PLANES.

For some time past it has been noted that many of the trade schools and school shops have been handicapped by the lack of planes to properly equip the wood-working classes. Many planes are lying idle on account of the breakage of some small part which costs only a few centavos.

In order to keep the school equipment up to its highest state of efficiency, the Bureau has decided to make arrangements so that a considerable quantity of repair parts for planes will be kept in stock in Manila.

It will be of interest to note that there are 7,727 planes on hand in the various school shops in the Islands; of these 3,769 are block planes, 1,550 fore planes, 972 jack planes, 267 smooth planes, 980 assorted planes, 143 jointers, 30 combination (universal) planes and 16 circular planes.

During the past year the Bureau has ordered 3,940 repair parts for the above planes.

About the first of September a complete machinery outfit for making shell windows was shipped to Camiling, Tarlac, by the Bureau of Supply, upon requisition from this office. This is the only machine for making shell windows and doors which has been furnished to any of the schools by the Bureau.

Denver, Colorado, opened a trade school last year which is known as the Denver School of Trades. Instruction is offered in carpentry and cabinetmaking, printing and book-binding, painting and interior decoration, plumbing and gas-fitting. Trade drafting, history, mathematics, English, and science are included in the courses. Half of the time of each day is given to shopwork, and the remaining time is divided between

drafting and academic subjects. The school is open to boys of Denver of sixteen years or over who have completed eight grades in the public schools or the equivalent of that time. The enrollment is limited to two hundred during the first year.

The establishment of the school met with the approval of the trades unions and the American Federation of Labor.

The following directions were prepared by the supervisor of needlework in the provincial high school of Leyte. These instructions give definite information relative to standard articles which are made in the schools of that division, and as they may be of value to other teachers and students of needlework, they are published herewith:

EMBROIDERY.

1. Handkerchiefs:

- (a) Ladies'. Cut 12 inches square. One yard is sufficient for 9 handkerchiefs.

Hem when finished, $\frac{1}{4}$ inch.
Draw 3 threads.

Catch 3 threads to 1 stitch.

Number of threads depends on fineness of linen.

Embroidery—single design.

Make one dozen with same design.

- (b) Gentlemen's. 1 m. is sufficient for 4 handkerchiefs 20×20 inches.

Hem, when finished, to be $\frac{1}{2}$ inch.

Draw three threads—catch 4 to 1 stitch.

Initial when certain of purchaser.

For general market do not letter.

2. Table linen:

- (a) Doily sets, round, run 22, 18, 15, 12, 10, and 6 inches in diameter. Plate

- doilies, 10 inches, in sets of 6. Tumbler doilies, 3 inches, in sets of 6. Dessert doilies, 5 inches, in sets of 6. Design on each doily of set should be the same.
- (b) Rectangular or oval. Runners, 60×24 inches, or 72×27 inches. Platter doilies, 27×15 inches, oval; 22×11 inches, oval; 12×6 inches, oval. Tray cloths, 27×14 inches, hemmed; 20×10 inches, 12×6 inches, hemmed; 8×4 inches, hemmed.
- Lunch cloth, 34×34 inches, hemmed.
- Lunch cloth, 35×35 inches, round.
- (c) General instructions:
1. Use doily linen, or Irish linen, coarse, or Butcher's linen, fine.
 2. Use scallop—conventional designs—not close work—sprays, knots, etc.
 3. Hemstitch and drawn work; only one row of drawn work.
 4. Hemstitch tray cloths and use bobbin lace; width of hems depends on size of piece; hem largest piece 2½ inches, smallest hem ½ inch wide.
 5. Draw only three threads unless the hem is double hemstitched, then as many as 6 or 8, depending on texture of linen.
 6. Hem tray cloths ¼ inch and use bobbin lace. Do not hemstitch.
 7. Lunch cloths may also be finished with patterns of Irish crochet.
 8. Tray cloths may be hemmed or hemstitched—two styles.
 9. Hemstitch rectangles.
 10. Hem rounds and ovals.
 11. A hemmed hem should never be more than ¼ inch wide. Lace is always placed on top of the hem, never on the edge.

The Sorsogon siesta chair which has been quite popular at the Bureau of Education Carnival and Exposition exhibits of former years has undergone a recent change in design and finish and will be sold in the future for ₱17.50 instead of ₱12.50, the old price.

In using nito straw, a very pretty effect can be secured by scraping away the black epidermis from the sides, thus having a central strip of black and on each side of it a white strip. Another variation consists in scraping the central part. This gives a white central strip and two black strips.

PRODUCTION OF CORN.

A good corn crop throughout the world would mean a production of 2,000,000,000 cavanese. Of this amount the various nations would furnish the following figures:

United States	1,000,500,000
Argentina	200,000,000
Austria-Hungary	200,000,000
Mexico and Central America	200,000,000
All other countries	399,500,000

In connection with the work for the improvement of designs used in industrial work, a set of drawings for dolls' faces has been worked out in the General Office of the Bureau of Education. This has been done in a simple way with no shading and as few lines as possible. Stencils can be cut from them so that the application may be made easy and the result a pleasing and typical Filipino countenance.

PRICES OF PICTURE FRAMES.

Picture frames are made in large numbers in most trade schools and considerable time is lost in estimating the prices thereof as each new order is received. To obviate this delay and to insure uniform prices, the Philippine School of Arts and Trades has worked out a price list of frames, covering all current sizes and kinds of wood. By its use, a prospective purchaser may be informed, quickly and definitely, of the exact price of his frame, and may be assured that the price given is neither higher nor lower than that previously quoted to some one else for a similar frame.

Prices naturally vary with local conditions and Manila prices are usually higher than those prevailing in the provinces. The price list of the Philippine School of Arts and Trades may be of value to other schools in fixing local prices if used as a basis from which a definite discount is made. Any trade school principal desiring a copy of this price list may secure one gratis by requesting the same from the Superintendent of the Philippine School of Arts and Trades.

JUNIOR INDUSTRIAL TEACHER EXAMINATION.

The last civil-service examination for junior industrial teachers was held May 24, 1912. Tests were given

in agriculture, domestic science, woodworking, and ironworking.

Twenty-five applicants tried the examination in agriculture and eight passed. Of the successful candidates, seven had been pensionados at the College of Agriculture and one had been a teacher in Ilocos Sur since 1908.

Twenty-three girls tried the domestic science examination and only four were successful. Two of these were returned students from the United States and two were formerly pensionadas at the Normal School.

Five boys attempted the ironworker's test and only one, a graduate of the Philippine School of Arts and Trades, passed.

All six contestants in the weaving examination failed to make the required grade.

In woodworking ninety-five were examined but only sixteen passed. Of these, nine were pensionados from the Philippine School of Arts and Trades and four were graduates from the same institution. Of the remaining three, one each came from Albay, Cebu, and Pangasinan.

Experience has proved that loom weaving is one of the most useful industries which can be taught to Igorot girls in the Mountain Province. For several years past these girls have been trained in the weaving of cloths in their schools. Now, where the girls have had sufficient training to understand the necessary processes connected with the weaving of cloths on such looms, it is proposed to go a step further and introduce the loom into Igorot homes. After the introduction of looms into the homes, the supervising and other teachers of the Mountain Province will be expected to oversee the work and to assist the girls in securing thread and other materials, as well

as in disposing of their products. It is expected that considerable progress will be made along this line during the present school year.

In the city of Manila over 780,000 umbrellas are manufactured each year. Most of them are of the common type which consists of black cotton cloth, steel spokes, and a curved bamboo stick which has had both ends filled with rattan to keep it from splitting or breaking when bent.

It is easily understood that the steel and the cotton cloth should be imported; but it is even true that nearly every piece of bamboo and rattan which is used in this big industry is imported from China or Japan. Yet an almost unlimited supply of rattan and bamboo, which would be well suited for this purpose, is to be found in nearly every part of the Philippines.

A POLISH FOR WOOD.

The wooden parts of tools, such as the stocks of planes and handles of chisels, are often made to have a nice appearance by French polishing; but this adds nothing to their durability. A much better plan is to let them soak in linseed oil for a week, and rub with a new cloth for a few minutes every day for a week or two. This produces a beautiful surface, and has a solidifying effect on the wood.

IN FAVOR OF SMALL TIMBER.

The statement that a 12 by 12 inch beam, built up of 2 by 12 planks spiked together, is stronger than a 12 by 12 inch solid timber, will strike a novice as exceedingly absurd. An authority on the subject says every millwright and carpenter knows that it is so, whether he has ever tested

it by actual experience or not. The inexperienced will fail to see why a timber will be stronger simply because the adjacent vertical longitudinal portions of the wood have been separated by a saw, and if this were the only thing about it, it would not be stronger; but the old principle that a chain is no stronger than its weakest link comes into consideration. Most timbers have knots in them, or are sawed at an angle to the grain, so that they will split diagonally under a comparatively light load. In a built-up timber no large knots can weaken the beam except so much of it as is composed of one plank, and planks whose grain runs diagonally will be strengthened by the other pieces spiked to them.

In many of the towns on the island of Panay, especially those near the mountains, it is no uncommon thing to find bolos with handles carved to represent the heads of certain animals, notably those of the monkey and tiger.

Since the tiger is not of the fauna of the Philippines, but is found in the Malay Peninsula, it is evident that this custom reaches back to the Peninsula and was probably brought to the Philippines with the Orang Laut in their early migrations or excursions during the first centuries of the Mohammedan domination of the Malay Archipelago. Some fine specimens of this carving can be obtained in Banga of Capiz Province in the barrios of Alfonso XII, Rizal, and Ortega. The same work is done in the hill barrios of northern Antique.

In Miagao, Iloilo Province, there is a large number of blankets or "hammocks" woven of cotton on the old "sicad" hand looms. These hammocks were woven from cotton

raised near Miagao and were used for decoration of arches on feast days.

The designs woven in the cloth are representative of certain stories and myths that probably had their origin long before the emigration of the Borneans to Panay. There are certain similarities in design between the cloths of Borneo and those of these Miagao "tapestries."

The art of weaving this cloth has been lost and the present examples of the art are becoming rare and costly; they are held as heirlooms by the families possessing them.

Buri raffia cloth is woven in the barrio of Bayan, municipality of New Washington, Capiz Province, and has been woven there from time immemorial. Tradition has it that the Island of Panay was originally settled by seven datos from Borneo who probably brought this craft with them. In some of the isolated barrios in Iloilo Province, this buri raffia cloth is yet being woven on the "sicad" or old hand loom similar to that in use among several non-Christian tribes of the Philippines and to the "tumpoh" of the Dusuns in British North Borneo.

BUREAU OF EDUCATION PUBLICATIONS.

(Abbreviated list.)

ANNUAL REPORTS:

- Eighth Annual Report of the Director of Education, 1908. (Supply limited.)
- Ninth Annual Report of the Director of Education, 1909.
- Tenth Annual Report of the Director of Education, 1910. (Supply limited.)
- Eleventh Annual Report of the Director of Education, 1911.
- Twelfth Annual Report of the Director of Education, 1912. (In course of preparation.)

BULLETINS:

- 5. Notes on the Treatment of Smallpox.
- 10. Government in the United States. Prepared for use in the Philippine Public Schools.
- 24. Outline of Year's Course in Botany and Key to the Families of Vascular Plants in the Philippine Islands.
- 29. Constructive Lessons in English, Designed for Use in Intermediate Grades.
- 31. School and Home Gardening.
- 32. Courses in Mechanical and Freehand Drawing, for Use in Trade and Intermediate Schools.
- 33. Philippine Hats. (Supply limited.)
- 34. Lace Making and Embroidery.
- 35. Housekeeping and Household Arts—A Manual for Work with the Girls in the Elementary Schools of the Philippine Islands.
- 36. Catalogue and Announcement of the Philippine Normal School. (Edition exhausted.)
- 37. School Buildings and Grounds.
- 38. School Buildings—Plans, Specifications and Bills of Material. (In course of preparation.)
- 39. A Manual of Freehand Drawing for Philippine Primary Schools. (In course of preparation.)
- 40. Athletic Handbook for the Philippine Public Schools.
- 41. Service Manual of the Bureau of Education.
- 42. Intermediate English II—Notes, Directions, and Aids to the Preparation of the Correspondence Study Course.
- 43. Catalogue of the Philippine School of Arts and Trades, 1911-12.

- 44. Libraries for Philippine Public Schools.

CIVICO-EDUCATIONAL LECTURES:

- 1. The Rights and Duties of Citizens of the Philippines. (Supply limited.)
- 2. The Prevention of Diseases. (Supply limited.)
- 3. Rice. (Supply limited.)
- 4. Diseases of Animals. (Supply limited.)
- 5. Coconut Beetles. (Supply limited.)
- 6. The Housing of the Public Schools. (Supply limited.)
- 7. Coconuts.
- 8. Corn.

THE TEACHERS' ASSEMBLY HERALD

- Volume I, 1908. (Edition exhausted.)
- Volume II, 1909. (Edition exhausted.)
- Volume III, 1910. (Edition exhausted.)
- Volume IV, 1911. (Supply limited.)
- Volume V, 1912. (Supply limited.)

TEXTBOOKS:

- Selected Short Poems by Representative American Authors.
- Commercial Geography; the Materials of Commerce for the Philippines.
- Macaulay's Samuel Johnson; Emerson's Self Reliance; Lincoln's Gettysburg Address.
- An Introduction to the Study of Colonial History. (In course of preparation.)

MISCELLANEOUS:

- Woodworking, a Manual of Elementary Carpentry for Philippine Public Schools.
- Some Recipes for Preparing Jellies, Preserves, Pickles, and Candies from Philippine Fruits. (Supply limited.)
- Syllabus of Economic Conditions in the Philippines. (Supply limited.)
- A Statement of Organization, Aims, and Conditions of Service in the Bureau of Education.
- The School of Household Industries. (In course of preparation.)

THE PHILIPPINE CRAFTSMAN:

- Volume I. (Now current.)

